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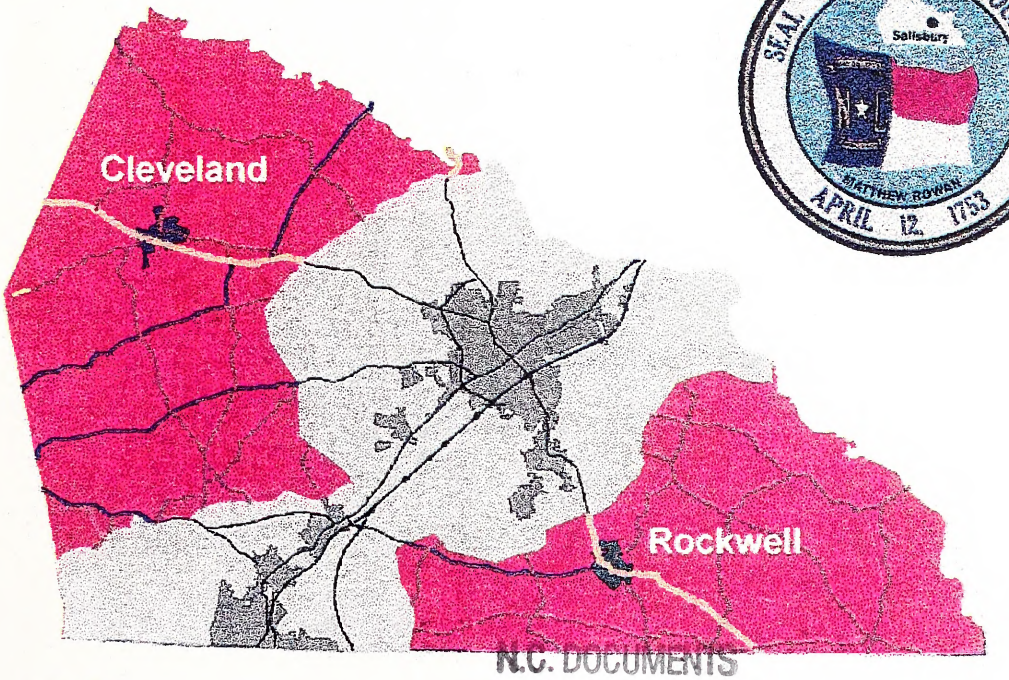
North Carolina Department of
Transportation
Division of Planning and Environment
Statewide Planning Branch

Rowan County Thoroughfare Plan and Report



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THE
ROWAN COUNTY
THOROUGHFARE PLAN

Prepared by the:

Statewide Planning Branch
Division of Highways
North Carolina Department of Transportation

In Cooperation with:

The County of Rowan
The Town of Cleveland
The Town of Rockwell
The Federal Highway Administration
The United States Department of Transportation

March, 2000

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER LINDA DOSSE

Linda Dosse, P.E. 3-29-2000
Project Engineer

ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

Overview

In 1999 the Rowan County Thoroughfare Plan was completed as a part of a larger effort to plan for the County's future. The Salisbury Urban Area Thoroughfare Plan was completed in 1997 and the Cabarrus-South Rowan Urban Area Transportation Plan was completed in 1996. The two Urban Areas take in the land area that is urban in nature at present and expected to be in the near future. Outside those planning boundaries the County is more rural in nature. The Rowan County Thoroughfare Plan includes only the area outside the Urban Area boundaries.

Thoroughfare Planning

Thoroughfare planning helps to ensure that the transportation system in the County is efficient enough to provide quick and convenient transportation for the people and goods of the region over the next 25 years. In a thoroughfare plan, future traffic problems are anticipated and recommendations are developed for improving the road system. This plan consists of a system of major roads and highways that will satisfy the anticipated transportation needs of Rowan County into the 21st century.

Two major benefits are derived from thoroughfare planning. First, each road can be designed with a specific function and a specific level of service in mind. This will save money in right-of-way, construction and maintenance costs. Through traffic will be minimized in neighborhoods by designating certain roads to be used primarily for through-travel. Also, local officials will be informed of future road improvements which can be incorporated into the community by allowing developers to design subdivisions that incorporate proposed roads, and allowing school and park officials to better locate their facilities.

Summary of Recommendations

The following is a summary of major recommended improvements to the roads in Rowan County over the next 25 years. These improvements are based on many factors, including population projections, land use patterns, traffic data, roadway conditions, bridge conditions, environmental concerns, and public input. Recommendations for the urban areas are not included in this report because they have separate thoroughfare plans. However, the Salisbury and Cabarrus-South Rowan Thoroughfare Plans are located in Appendix B. Complete recommendations are listed in Chapter 2 and outlined in the Street Index in Appendix H.

R-2903 US 52 Relocation from I-85 north of Salisbury to south of NC 49 at Richfield. Four-lane facility on new location.

R-2911 US 70 from SR 2318 in Statesville to US 601 in Salisbury. Widen to multi-lanes.

B-2612 NC 8-49 replace southbound lane bridge over the Yadkin River.

Amity Hill Road from Iredell County to US 70. Widen to full 12-foot lanes.

Bringle Ferry Road from the Salisbury Boundary to Dan Nicholas Park. Widen to extend the bike lanes from Salisbury.

Brown Road from the Cabarrus-South Rowan Boundary to Millbridge Road. Widen to full 12-foot lanes.

Caldwell-Hall Road Connector from Millbridge Road to Amity Hill Road. Widen facilities to full 12-foot lanes.

Millbridge Road from the Cabarrus-South Rowan Boundary to Caldwell Road. Widen to full 12-foot lanes.

NC 150 from the Salisbury Boundary to Graham Road. Widen to five lanes.

NC 152 East from the Cabarrus-South Rowan Boundary to Old Concord Road widen to three lanes. From Old Concord Road to US 52 widen to four lanes.

NC 152 East-US 52 Relocation Connector from US 52 to Stokes Ferry Road. Widen facilities to 14-foot lanes.

NC 152 West from Iredell County to the Cabarrus-South Rowan Urban Area Boundary. Widen to three lanes.

Old Beattys Ford Road from Old Concord Road to Lower Stone Church Road. Widen to 10-foot lanes.

Old Concord Road from the Cabarrus-South Rowan Boundary to NC 152 widen to three lanes. From NC 152 to the Salisbury Boundary widen to five lanes.

Patterson Road from Millbridge Road to NC 150. Straighten out the many curves.

Third Creek Church Road from US 70 to Old US 70. Widen to

11-foot lanes and straighten out the many curves.

Woodleaf Road from the Salisbury boundary to NC 801. Widen to full 12-foot lanes.

Implementation

The development of the thoroughfare plan is the first step in getting new road and highway projects implemented. This plan should be used by Rowan County as technical support when requesting projects from the North Carolina Board of Transportation, from the NCDOT Division Engineer, or at the Transportation Improvement Program (TIP) hearings held every other year. The plan should also be used when the County develops other plans, such as land use, parks and recreation, or area comprehensive plans, or when making policy decisions, such as subdivision approvals, to ensure that these will be compatible with the proposed roadway system.

The Statewide Planning Branch of NCDOT can help with these tasks by answering questions, reviewing subdivision plats, and preparing functional designs of proposed roads.

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CHAPTER 1

INTRODUCTION

This report documents the results of a long-range thoroughfare planning study of the present and future transportation system in Rowan County.

Thoroughfare planning helps ensure that the County transportation system is efficient enough to provide quick and convenient transportation for the people and goods of the region over the next planning horizon. In a thoroughfare plan future traffic problems are anticipated and recommendations are developed for improving the road system.

Two major benefits are derived from thoroughfare planning. Each road or highway can be designed with a specific function and a specific level of service in mind. This will save money in right-of-way, construction and maintenance costs. It will also protect neighborhoods from "cut-through" traffic by designating certain roads to be used primarily for through-travel. Local officials will also be informed of future road improvements and can incorporate them into other planning and policy decisions. This will allow developers to design subdivisions that incorporate proposed roads, allow school and park officials to better locate their facilities, and minimize negative impacts to the community.

A well-planned transportation system is an asset to the economic and social well-being of a growing community. It provides the means to transport people and goods from one place to another quickly and conveniently. A good highway system must not only meet existing travel demands but must also keep pace with the development of the region.

Thoroughfares were located based upon existing and anticipated land use and population distribution, topographic conditions, and field investigations. Certain priorities were be established in the development of the thoroughfare system. These priorities were based on maintenance needs, bridge inadequacies, poor alignments, and insufficient present and future roadway capacities.

The proposed Rowan County Thoroughfare Plan was developed following the basic principles of thoroughfare planning as described in Appendix A. The plan recommends those improvements that are felt to be essential for proper traffic circulation within the 1995-2025 planning period.

Most of the proposed improvements will be the responsibility of the North Carolina Department of Transportation. However,

Rowan County can provide assistance in the implementation of the plan through subdivision regulations and zoning ordinances. It will be desirable for the plan to be formally adopted by both the County Commissioners and the North Carolina Department of Transportation to serve as an official guide in providing a well coordinated, adequate, and economical major thoroughfare system.

The objective of thoroughfare planning is to enable the transportation network to be progressively developed to adequately meet the transportation needs of a community or region as land develops and traffic volumes increase. By not planning now for our future transportation needs, unnecessary cost to the physical, social, and economic environment may very well be incurred. Thoroughfare planning is a tool that can be used by local officials to plan for future transportation needs, while at the same time reducing the costs to our environment.

GEOGRAPHIC LOCATION
FOR
ROWAN COUNTY
NORTH CAROLINIA

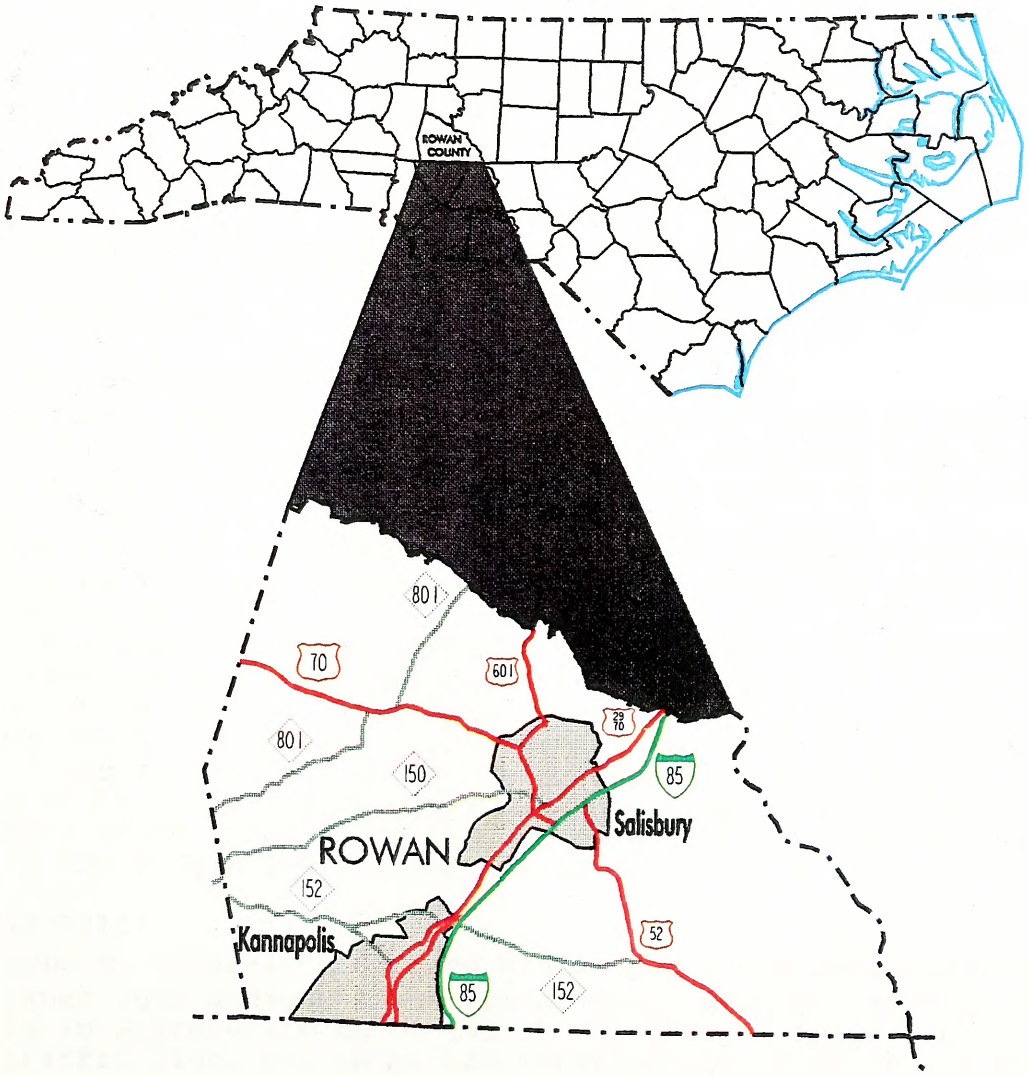


FIGURE 1–1

CHAPTER 2

THOROUGHFARE PLAN

A thoroughfare planning study identifies existing and future deficiencies in the transportation system and proposes solutions to solve these problems. The recommendations for the Rowan County Thoroughfare Plan are listed below and shown in Figure 2-1. These recommendations only cover those portions of the County outside the Salisbury Urban Area Planning Boundary and the Cabarrus-South Rowan Urban Area Planning Boundary. Each road in the thoroughfare plan was evaluated based on the following factors: alignment, capacity, lane width, number of lanes, traffic volume, land use patterns, and pavement structures(see Appendix H). Additionally, concerns such as environmental issues, economic growth, and local input were also considered.

PRINCIPAL ARTERIAL SYSTEM - These facilities carry substantial statewide or interstate travel with longer trip lengths and higher travel densities.

US 52 Relocation(R-2903)
Description: four-lane divided, uncontrolled access facility part on new location, part widening of existing facility, from the I-85/Old Union Church Rd Interchange to NC 49 south of Richfield in Stanly County
Purpose: Provide a regional facility connecting Rowan and Stanly Counties to I-85 and provide a safer, more efficient alternative to existing US 52.
Need: Existing US 52 has sections that are severely constricted by development and thus prevents future widening. It is projected that existing US 52 will be over capacity by the design year and channels both through and local traffic into the already congested US 52/Innes Street/I-85 area. This congestion also decreases the safety of the existing facility. This relocation will provide an alternate route parallel to the existing facility and alleviate some of the congestion and improve safety.

US 70(R-2911)
Description: four-lane divided widening and new location(with five-lanes curb-and-gutter in urban areas) shoulder section from SR 2318 in Statesville to US 601 in Salisbury There should also be a traffic light put in at the intersection of US 70 and Old US 70 to control the volume of turning traffic at that intersection.
Purpose: Provide safer, more efficient access to development along existing US 70 and reduce congestion due to the anticipated increase in both commercial and residential traffic along the facility.

Need: There are numerous driveways along the facility, and a projected truck percentage as high as ten percent. The widening will help with the driveway turn movements and increase safety along the facility. The new location will bypass those sections with difficult access problems.

NC 8-49
NC 49 is part of the Intrastate Highway System. The southbound bridge over the Yadkin River is the only piece that is in Rowan County.

MINOR ARTERIAL SYSTEM - These facilities generally serve intrastate and intercounty travel with trip lengths somewhat less than the principal arterial system.

NC 152 West: Iredell County to Cabarrus-South Rowan Planning Boundary. A three-lane curb and gutter section should be used due to high turning traffic.

US 601: Davie County to Salisbury Planning Boundary. The current cross section is adequate.

COLLECTOR ROAD SYSTEM - These facilities generally serve intracounty travel and even shorter distances. They are further classified into major and minor collector.

MAJOR COLLECTORS -

NC 152-US 52 BYPASS CONNECTOR
These facilities should be upgraded and made the through movement from NC 152 in Rockwell to Stokes Ferry Rd(SR 1004). This will serve as a new entrance into the Town of Rockwell from the proposed US 52 Bypass. It will also allow the trucks making the turn from US 52 south to NC 152 to make it on the four-lane divided highway rather than in the middle of Rockwell.

Market St (SR 2341) Fourteen-foot lanes.
Upper Palmer Rd (SR 2341) Fourteen-foot lanes
Gold Knob Rd (SR 2375) Fourteen-foot lanes
Barger Rd (SR 2377) Fourteen-foot lanes
Trexler Rd (SR 2378) Fourteen-foot lanes.

Bringle Ferry Rd (SR 1002) The cross section on this road should be adequate, but from Salisbury to past Providence Church Road bike lanes or wide outside lanes should be added to reach Dan Nicholas Park. Also the curve in the T-intersection with Shaver Road (SR 2144) should be straightened out.

Faith Rd (SR 1006)

Millbridge Rd (SR 1350) Two full twelve-foot lanes are recommended from the Cabarrus-South Rowan Boundary to Caldwell Road. The cross section for the remaining section to NC 150 should be sufficient.

Miller Rd (SR 1509)

NC 150 The existing cross section should be adequate from the Iredell County line to Graham Rd. From Graham Rd to the Salisbury Planning Boundary a five-lane cross section is suggested with wide outside lanes to accommodate bicycles traveling to and from Sloan Park. Also, the five-way intersection at Atwell Rd (SR 1550) should be realigned to tee Atwell into NC 150 across from Lipe Rd to improve the safety at that intersection. The intersection of Millbridge and White Rd also should be realigned to make a four-way intersection.

NC 152 East The recommended cross section is a three-lane cross section from the Cabarrus-South Rowan Area to Old Concord Rd and a four-lane section with turn-lanes at the major intersections from Old Concord Rd to existing US 52. The intersection of SR 1006 should be made into a four-way intersection to eliminate weaving.

NC 801 The existing cross section should be sufficient but several intersections should be corrected for safety reasons. A turn lane should be placed in front of Mt. Ulla School. The intersection with White Rd and Sherrills Rd should be realigned to form a four-way intersection and the vertical sight distance should be corrected. The six-leg intersection in Woodleaf should be corrected and the side roads realigned.

Old Concord Rd (SR 1002) The suggested improvements for this facility are a three-lane curb-and-gutter section from the Cabarrus-South Rowan Planning Boundary to NC 152 and a five-lane curb-and gutter section from NC 152 to the Salisbury Boundary.

Organ Church Rd (SR 1006) The existing cross section on this facility should be sufficient, but the intersection at Old Beattys Ford Rd (SR 1221) should be realigned into a four-way intersection.

Stokes Ferry Rd (SR 1004) The cross section on this facility should be sufficient, but the intersection at St. Matthews Rd and Liberty Rd(SR 2140) should be realigned for better sight distances and signalization.

Existing US 52

White Rd (SR 1737)

Woodleaf Rd (SR 2048) The expected increase in traffic recommends that the facility be widened to two full twelve-foot lanes.

MINOR COLLECTORS -

Amity Hill Rd (SR 1001) From the Iredell County line to US 70 this facility should be widened to two full twelve-foot lanes.

Baker Mill Rd (SR 1957)

Brown Rd (SR 1211) The suggested cross section for this facility is two twelve-foot wide lanes.

Caldwell Rd/Graham Rd/Ketchie Rd/Hall Rd(SR 1547, SR 1747) These four facilities form a feeder-distributor connection for the traffic traveling northwest and southeast on the west side of the county. The suggested cross section for these facilities is two twelve-foot wide lanes. The intersection of Hall Rd and Ketchie Rd should be realigned so Hall Rd becomes the through movement.

Concordia Church/Corriher Springs Rd (SR 1353,1554)

Cool Springs Rd (SR 1003,2048)

Doby DR (SR 2351)

Emanual Church Rd (SR 238)

Liberty Rd (SR 2140)

Main St. Cleveland (SR 1743)

Mt. Hope Church Rd (SR 1505)

Old Beattys Ford Rd (SR 1221,2356) From Old Concord Rd to Lower Stone Church Rd the suggested cross section is two ten-foot lanes. The existing section from Lower Stone Church Rd to Stokes Ferry Rd is adequate. Several intersections, though, need improvement. There is a severe hump in the at-grade rail crossing just west of existing US 52 that should be lowered. There are two minor offset intersections, at SR 2335, and SR 2569, which should be straightened out into four-way intersections to eliminate weaving.

Old NC 80 (SR 2350)

Patterson Rd (SR 1533) There are numerous curves along the existing facility which should be straightened.

Providence Church Rd (SR 2134)

Richfield Rd (SR 1005)

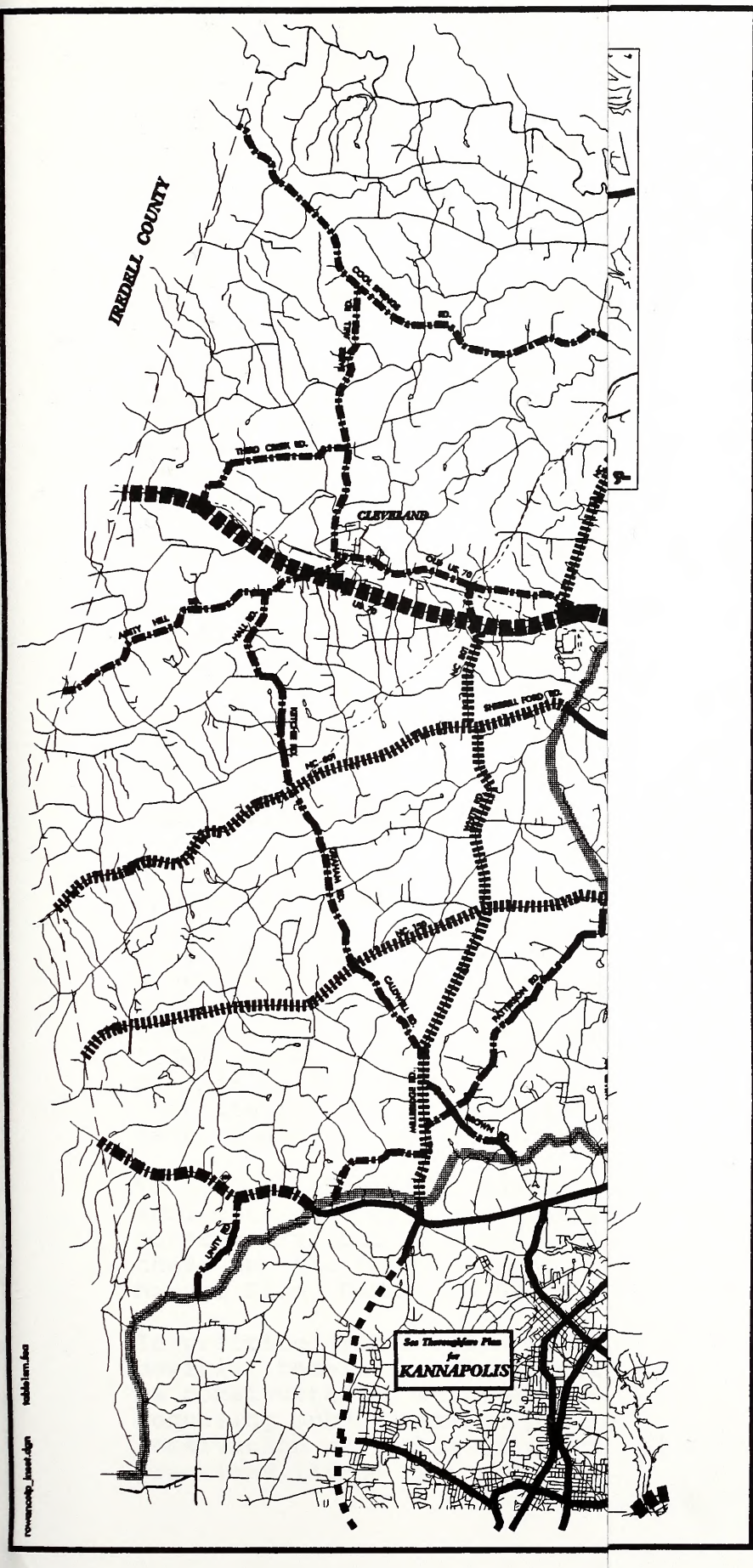
St. Matthews Rd (SR 2140)

St. Stephens Church Rd (SR 2352)

Stone Rd (SR 2378)

Third Creek Church Rd (SR 1957,1973) There are numerous curves along the existing facility which should be straightened. This facility is used as a frequent local bypass around Cleveland and is also the center of a growing residential area. The recommended cross section is two eleven-foot lanes.

Unity Rd (SR 1355)



THOROUGHFARE PLAN FOR ROWAN COUNTY

FIGURE 2-1

LEGEND

	existing	proposed
PRINCIPAL ARTERIAL		
MINOR ARTERIAL		
MAJOR COLLECTOR		
MINOR COLLECTOR		
URBAN FREEWAY		
URBAN MAJOR THOROUGHFARE		
URBAN MINOR THOROUGHFARE		
PLANNING AREA BOUNDARY		
INTERCHANGE		
GRADE SEPARATION		

ADOPTED BY:

COUNTY OF ROWAN	APRIL 19, 1999
TOWN OF CLEVELAND	MAY 10, 1999
TOWN OF ROCKWELL	MAY 10, 1999
NCDOT STATEWIDE PLANNING BRANCH	MAY 14, 1999
NC DEPARTMENT OF TRANSPORTATION	SEPTEMBER 24, 1999

MAP DATE
APRIL 19, 1999

ROWAN COUNTY
NORTH CAROLINA

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS - GIS UNIT

U.S.DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALES

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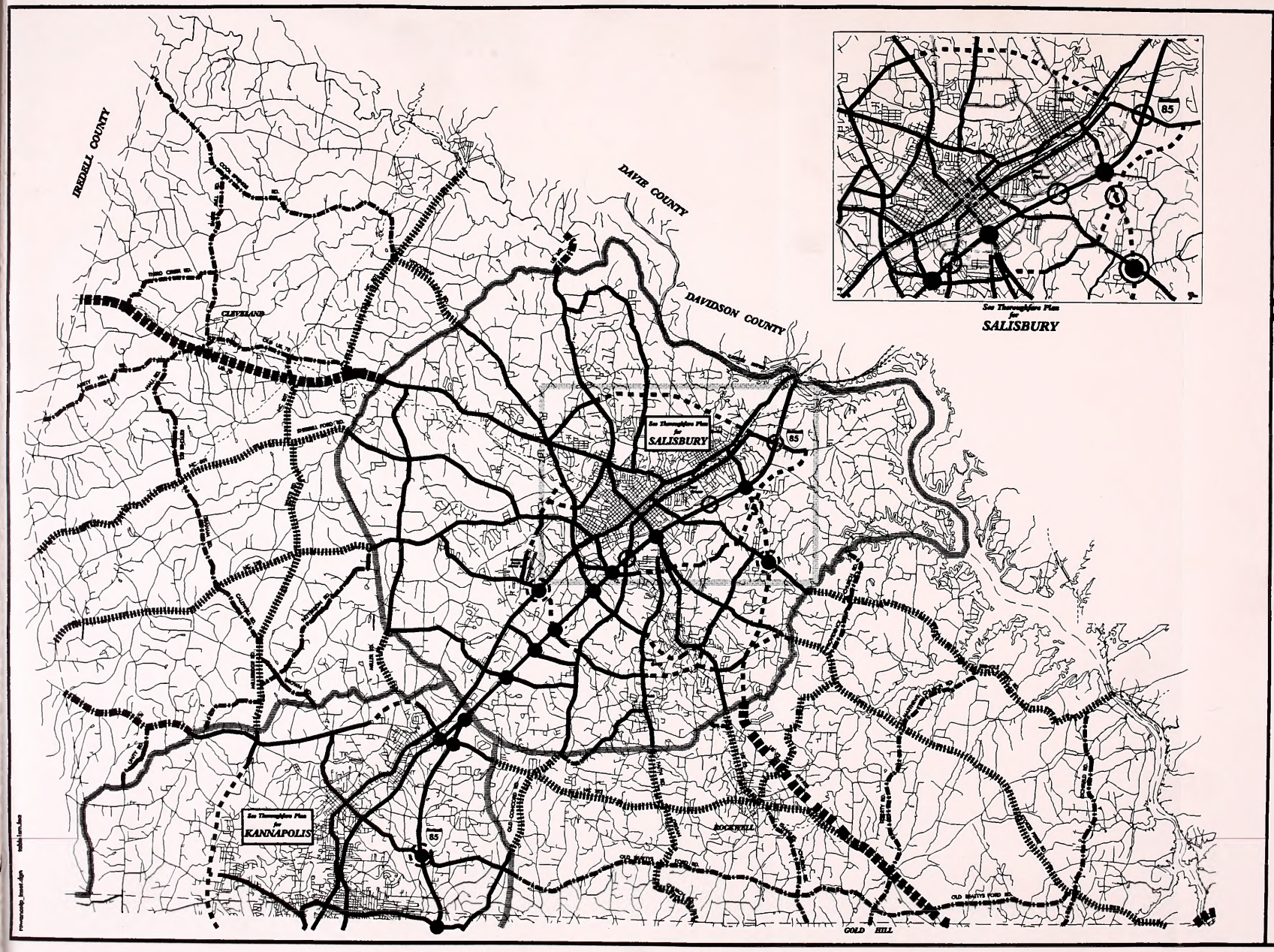
Miles



See Thoroughfare Plan for SALISBURY

THOROUGHFARE PLAN FOR ROWAN COUNTY

FIGURE 2-1

LEGEND

	existing	proposed
PRINCIPAL ARTERIAL		
MINOR ARTERIAL		
MAJOR COLLECTOR		
MINOR COLLECTOR		
URBAN FREEWAY		
URBAN MAJOR THOROUGHFARE		
URBAN MINOR THOROUGHFARE		
PLANNING AREA BOUNDARY		
INTERCHANGE		
GRADE SEPARATION		

ADOPTED BY:

COUNTY OF ROWAN	APRIL 19, 1999
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NCDOT STATEWIDE PLANNING BRANCH	MAY 14, 1999
NC DEPARTMENT OF TRANSPORTATION	SEPTEMBER 24, 1999

MAP DATE
APRIL 19, 1999

ROWAN COUNTY
NORTH CAROLINA

PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS - GIS UNIT
IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALE

1 0 1 2 3 4
Miles

CHAPTER 3

IMPLEMENTATION OF THE PLAN

Implementation of the adopted plan is one of the most important aspects of the thoroughfare plan. Unless implementation is an integral part of the process, all the effort and expense associated with the development of the plan is lost. Several methods for implementing portions of the thoroughfare plan are described in this chapter.

State and County Adoption of the Thoroughfare Plan

Rowan County and the North Carolina Department of Transportation (NCDOT) have mutually adopted the thoroughfare plan shown in Figure 3-1. That plan now serves as a guide for the NCDOT in the development of the road and highway system for the County. The approval of this plan by the County also enables standard road regulations and land use controls to be used effectively in the implementation of this plan.

Subdivision Regulations

Subdivision regulations are locally adopted laws governing the process of converting raw land into building sites. From the planner's view, subdivision regulations are important at two distinct levels. First, they enable the planner to coordinate the otherwise unrelated plans of many individual developers. This process assures that provision is made for land development elements such as roadway right-of-way, parks, school sites, water lines, sewer outfalls, and so forth. Second, they enable the planner to control the internal design of each new subdivision so that its pattern of streets, lots, and other facilities will be safe, pleasant, and economical to maintain.

To be most effective, subdivision regulations and their administration must be closely coordinated with other local governmental policies and ordinances. Among the more important of these are the Comprehensive Growth Plan, Utilities Extension Master Plan, CAMA Land Use Plan, and Thoroughfare Plan.

In practice, subdivision regulations can provide some very positive benefits such as requiring portions of major streets to be constructed in accordance with the thoroughfare plan, or requiring subdividers to provide for the dedication and/or reservation of rights-of-way in advance of construction. These practices reduce the overall cost of the plan by having some costs

borne by developers. Recommended Subdivision Ordinances are included in Appendix G.

Zoning Ordinances

A zoning ordinance can be beneficial to thoroughfare planning because planned locations of different land uses and planned densities of dwellings can be made. This provides a degree of stability on which to make future traffic projections and to plan streets and highways.

The characteristic feature of the zoning ordinance that distinguishes it from most other regulations is that it differs from district to district, rather than being uniform throughout a city. Thus, a given area might be restricted to single-family residential development with minimum lot size requirements and setback provisions appropriate for development. In other areas, commercial or industrial development might be permitted, and regulations would be enacted to control such development. Building code provisions or sanitary regulations, on the other hand, normally apply to all buildings in a certain category regardless of where they may be situated within a city.

The zoning ordinance does not regulate the design of streets, utility installation, the reservation or dedication of parks, street rights-of-way, school sites, and related matters. These are controlled by subdivision regulations or possibly by use of an official map. The zoning ordinance should however, be carefully coordinated with these and other control devices.

Development Reviews

Driveway access to a State maintained street or highway is reviewed by the District Engineer's office and by the Traffic Engineering Branch of the North Carolina Department of Transportation prior to access being allowed. Any development expected to generate large volumes of traffic (i.e., shopping centers, fast food restaurants, large industries, etc.) may be comprehensively studied by staff from the Traffic Engineering Branch, Statewide Planning Branch, and Roadway Design Branch of NCDOT. If done at an early stage, it is often possible to significantly improve the development's accessibility at minimal expense. Since the municipality is the first point of contact for developers, it is important that the municipality advise them of this review requirement and cooperate in the review process.

Other Funding Sources

1. Assess user impact fees to fund transportation projects. These fees, called "facility fees" in the legislation, are to be based upon "reasonable and uniform considerations of capital costs to be incurred by the city or town as a result of new construction. The facility fee must bear a direct

relationship to additional or expanded public capital costs of the community service facilities to be rendered for the inhabitants, occupants of the new construction, or those associated with the development process."

2. Enact a bond issue to fund street improvements.

3. Continue to work with NCDOT to have local projects included in the Transportation Improvement Program (TIP).

4. Consider the possibility of specific projects qualifying for federal demonstration project funds.

5. Adopt a collector street plan that would assess buyer or property owners for street improvements.

6. Industrial Access Funds. If an industry wishes to develop property that does not have access to a state maintained highway and certain economic conditions are met, then funds may be made available for construction of an access road.

7. Small Urban Funds. Small Urban Funds are annual discretionary funds made to municipalities with qualifying projects. The maximum amount is $1,000,000 per year per division. A town may have multiple projects. Requests for Small Urban Fund assistance should be directed to the appropriate Board of Transportation member and Division Engineer. The Board Member allocates this money at his or her discretion.

Construction Priorities and Cost Estimates

Construction priorities will vary depending on what criteria are considered and what weight is attached tot he various criteria. Most people would agree that improvements to the major thoroughfare system and major traffic routes would be more important than minor thoroughfares where traffic volumes are lower. To be in the North Carolina Transportation Improvement Program, a project must show favorable benefits relative to costs and should not be prohibitively disruptive to the environment. The potential cost estimate of the Rowan County projects with respect to the user benefits, and the probabilities that economic development will be stimulated and environmental impact will be minimized are given in Table 3-3. A guide to this table is shown in Table 3-1.

Reduced road user cost should result from any roadway improvement, from a simple widening to the construction of a new roadway. Roadway improvements should also relieve congested or unsafe conditions. Comparisons of the existing and the proposed facilities have been made in terms of vehicle operating cost, travel time cost, and accident cost. These user benefits are computed as total dollar saving over the 30 year design period

using data such as project length, base year and design year traffic volumes, traffic speed, type of facility, and volume capacity ratio.

TABLE 3-1 Probability Estimation Guide	
Subjective Evaluation	Impact Probability
Excellent to very substantial	1.00
Very good to substantial	0.75
Good to considerable	0.50
Fair to some	0.20
Poor to none	0.00

The impact of a project on economic development potential is shown as the probability that it will stimulate the economic development of an area by providing access to developable land and reducing transportation costs. It is a subjective estimate based on the knowledge of the proposed project, local development characteristics, and land development potential. The probability is rates on a scale from 0(representing no developmental potential) to 1.00(representing excellent developmental potential).

The environmental impact analysis considers the effect of a project on the physical, social/cultural, and economic environment of an area. Table 3-2 contains a list of items considered during the environmental analysis:

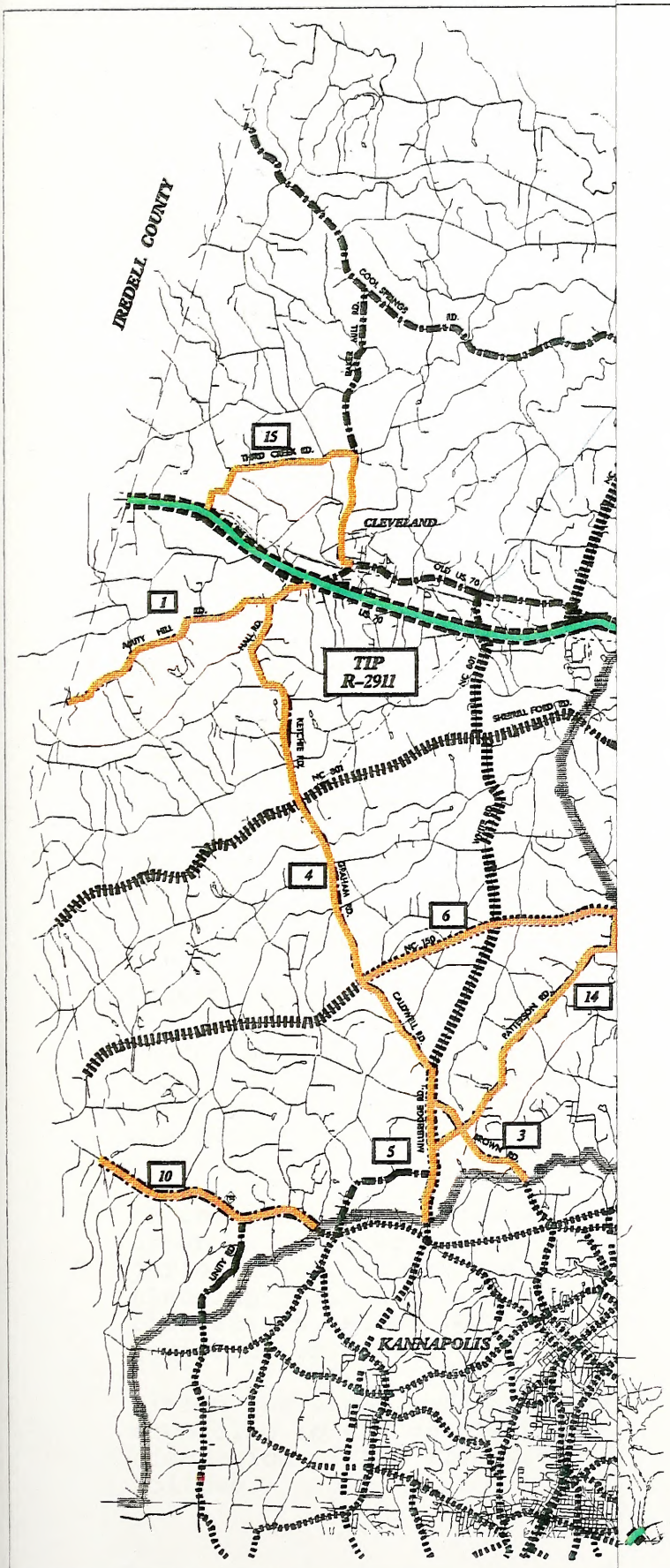
TABLE 3-2 Environmental Impact Considerations			
Air quality	Water quality	Soils and geology	Wildlife
Vegetation	Neighborhoods	Noise	Educational Facilities
Churches	Parks and recreational facilities	Historic sites and landmarks	Public health and safety
Aesthetics			

The environmental impact analysis also uses a probability rating from 0(representing no benefit to the environment) to 1.00(representing a positive benefit to the environment). A negative value is assigned to the probability to indicate a negative impact. The summation of both positive and negative impact probabilities with respect to these factors provides a measure of the relative environmental impacts of a project. Offsetting the benefits that would be derived from any project is the cost of its construction. A new facility, despite its high projected benefits, might prove to be unjustified due to the excessive costs involved in construction. The highway costs estimated in this report are based on the average statewide construction costs for similar project types. The anticipated

right-of-way cost is also included as an average cost per acre for property throughout Rowan County according to the respective project. Table 3-3 shows a breakdown of total project cost, construction cost, and total cost for the major recommendations on the Rowan County Thoroughfare Plan.

Table 3-3
Benefits, Cost Estimates and Environmental Impacts

No.	Project Name (Alphabetical)	Length (MI)	Construction Cost (000)	ROW Cost (000)	Total Cost (000)	User Benefits	Benefits/ MI	Economic Dev. Pot	Environmental Impacts	
									Positive	Negative
1	Amity Hill Rd	4.65	4378	1860	6238	minor	minor	0.50	0.75	0.20
2	Bringle Ferry Rd	1.20	270	1196	1466	minor	minor	0.20	0.50	0.20
3	Brown Rd	1.90	1811	3317	5128	minor	minor	0.20	0.20	0.20
4	Caldwell-Hall Rd Conn	9.10	9415	1995	11410	minor	minor	0.75	0.50	0.20
5	Millbridge Rd	2.82	2655	326	2981	minor	minor	0.20	0.20	0.00
6	NC 150	3.74	10568	1351	11919	158	42	0.20	0.20	0.50
7	NC 152 East (1)	1.30	2153	3048	5201	3359	2584	0.50	0.50	0.20
8	NC 152 East (2)	6.57	14776	2408	17184	16597	2526	0.50	0.50	0.50
9	NC 152 East-US 52 Conn	4.00	3946	4990	8936	minor	minor	0.75	0.50	0.50
10	NC 152 West	4.29	7042	4863	11905	7566	1764	0.20	0.20	0.20
11	Old Beattys Ford Road	6.70	6320	1155	7475	minor	minor	0.20	0.50	0.20
12	Old Concord Rd (1)	3.00	2824	3682	6506	4690	1930	0.20	0.20	0.20
13	Old Concord Rd (2)	0.93	2470	784	3254	1661	1786	0.20	0.20	0.20
14	Patterson Rd	4.75	4472	810	5282	minor	minor	0.50	0.50	0.20
15	Third Creek Church Rd	5.16	4917	3929	8846	minor	minor	0.75	0.75	0.50
16	Woodleaf Rd	2.70	2553	606	3159	minor	minor	0.75	0.50	0.20



RECOMMENDED IMPROVEMENTS FOR ROWAN COUNTY

FIGURE 3–1

LEGEND

PRINCIPAL ARTERIAL
MINOR ARTERIAL
MAJOR COLLECTOR
MINOR COLLECTOR
URBAN FREEWAY
URBAN MAJOR THOROUGHFARE
PLANNING AREA BOUNDARY
INTERCHANGE
GRADE SEPARATION
TIP PROJECTS
WIDENINGS

ADOPTED BY:

COUNTY OF ROWAN	APRIL 19, 1999
TOWN OF CLEVELAND	MAY 10, 1999
TOWN OF ROCKWELL	MAY 10, 1999
NCDOT STATEWIDE PLANNING BRANCH	MAY 14, 1999
NC DEPARTMENT OF TRANSPORTATION	SEPTEMBER 24, 1999

MAP DATE
APRIL 19, 1999

N
S

ROWAN COUNTY
NORTH CAROLINA

PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS - GIS UNIT
IN COOPERATION WITH THE
U.S.DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALES

1 0 1 2 3 4
Miles

Table 3-3
Benefits, Cost Estimates and Environmental Impacts

No.	Project Name (Alphabetical)	Length (MI)	Construction Cost (000)	ROW Cost (000)	Total Cost (000)	User Benefits	Benefits/ MI	Economic Dev. Pot	Environmental Impacts	
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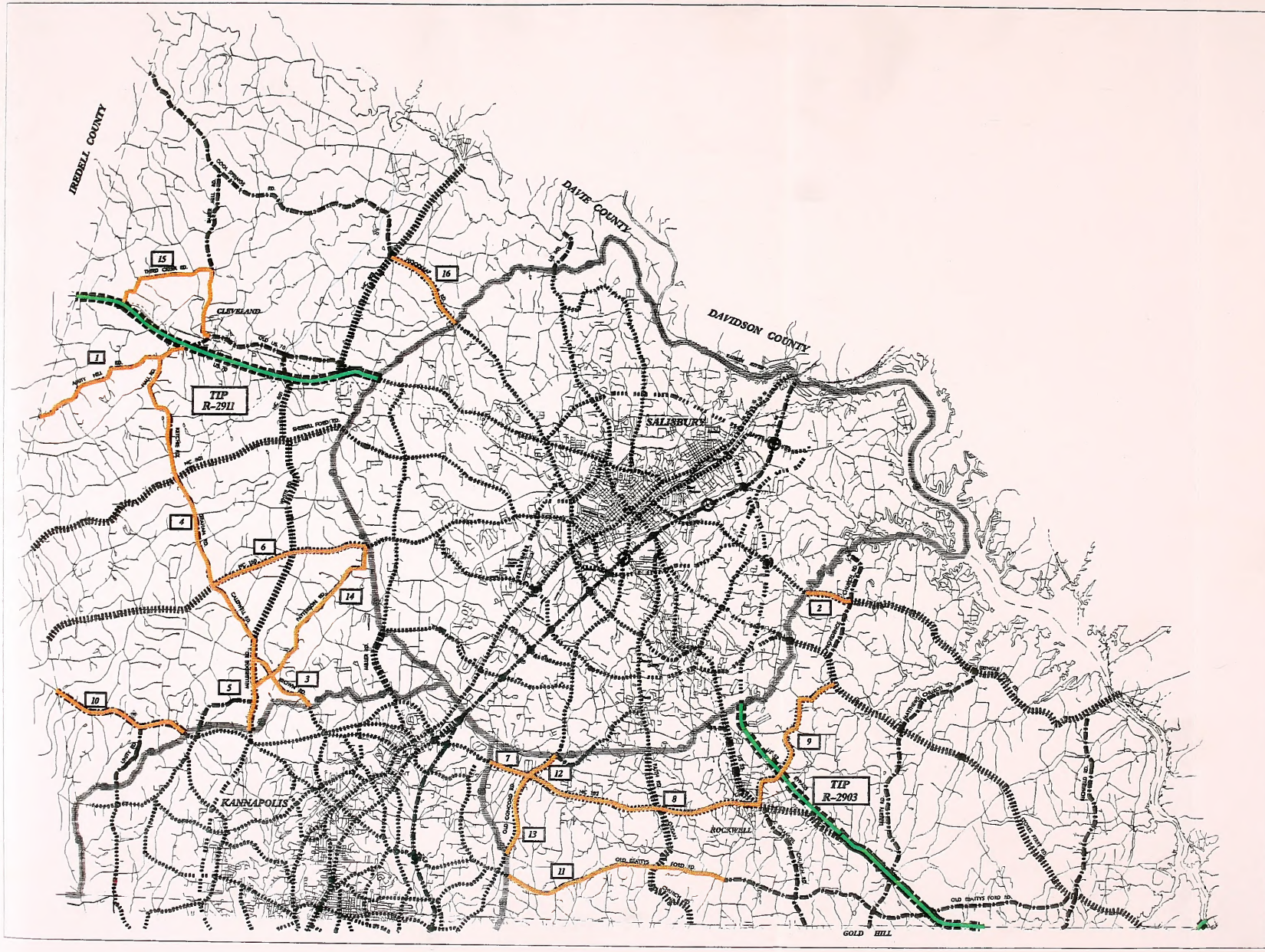

RECOMMENDED IMPROVEMENTS FOR ROWAN COUNTY

FIGURE 3-1

LEGEND

- PRINCIPAL ARTERIAL
- MINOR ARTERIAL
- MAJOR COLLECTOR
- MINOR COLLECTOR
- URBAN FREEWAY
- URBAN MAJOR THOROUGHFARE
- PLANNING AREA BOUNDARY
- INTERCHANGE
- GRADE SEPARATION
- TIP PROJECTS
- WIDENINGS

ADOPTED BY:

COUNTY OF ROWAN	APRIL 19, 1999
TOWN OF CLEVELAND	MAY 10, 1999
TOWN OF ROCKWELL	MAY 10, 1999
NCDOT STATEWIDE PLANNING BRANCH	MAY 14, 1999
NC DEPARTMENT OF TRANSPORTATION	SEPTEMBER 24, 1999

MAP DATE
APRIL 19, 1999

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SCALE

APPENDIX A

COUNTY

THOROUGHFARE PLANNING PRINCIPLES

There are many advantages to thoroughfare planning, but the primary mission is to assure that the road system will be progressively developed to serve future travel desires. Thus, the main consideration in thoroughfare planning is to make provisions for street and highway improvements so that, when the need arises, feasible opportunities to make improvements exist.

Benefits of Thoroughfare Planning

There are two major benefits derived from thoroughfare planning. First, each road or highway can be designed to perform a specific function and provide a specific level of service. This permits savings in right-of-way, construction, and maintenance costs. It also protects residential neighborhoods and encourages stability in travel and land use patterns. Second, local officials are informed of future improvements and can incorporate them into planning and policy decisions. This will permit developers to design subdivisions in a non-conflicting manner, direct school and park officials to better locate their facilities, and minimize the damage to property values and community appearance that is sometimes associated with roadway improvements.

County Thoroughfare Planning Concepts

The underlying notion of the thoroughfare plan is to provide a functional system of streets, roads, and highways that permit direct, efficient, and safe travel. Different elements in the system are designed to have specific functions and levels of service, thus minimizing the traffic and land service conflict.

In the county plan, elements are either urban or rural. In the urban planning area, the local municipality generally has planning jurisdiction. Outside the urban planning area, the county has planning jurisdiction. In those areas where no urban thoroughfare plan exists, elements are rural and are under the planning jurisdiction of the county.

Within the urban and rural systems, plan elements are classified according to the specific function they are to perform. A discussion of the elements and functions of the two systems follows.

Rural Thoroughfare Classification System

Streets perform two primary functions, traffic service and land access. When combined, these two functions are basically incompatible. The conflict is not serious if both traffic demands and land service demands are low. However, when traffic volumes are high, conflicts created by uncontrolled and intensely developed abutting property lead to intolerable traffic flow friction and congestion.

The thoroughfare plan provides a functional system of streets that permit travel from origins to destinations with directness, ease, and safety. Different streets in this system are designed to perform specific functions, thus minimizing the traffic and land service conflict.

In county thoroughfare planning, there are four major systems: principal arterials, minor arterials, major and minor collectors, and local roads.

- ***Principal Arterial System***

This system is a connected network of continuous routes that serve corridor movements having substantial statewide or interstate travel characteristics. This is shown by both the trip lengths and the travel densities. The principal arterial system serves all urban areas of over 50,000 population and most of those with a population greater than 5,000. The Interstate system constitutes a significant portion of the principal arterial system.

- ***Minor Arterial System***

This system forms a network that links cities, larger towns, and other major traffic generators such as large resorts. The minor arterial system generally serves intrastate and intracounty travel and travel corridors with trip lengths and travel densities somewhat less than the principal arterial system.

- ***Collector Road System***

The rural collector routes generally serve intracounty travel. These routes serve travel with distances that are shorter than on the arterial routes. The rural collector road system is subclassified into major and minor collector roads.

Major Collector Roads: These routes provide service to the larger towns not directly served by the higher systems and to other traffic generators of equivalent intracounty importance, such as consolidated schools, shipping points, county parks, significant mining and agricultural areas, etc. Major collector roads also link these places to routes of higher classification and serve the more important intracounty travel corridors.

Minor Collector Roads: These collect traffic from local roads and bring all developed areas within a reasonable distance of a major collector road. They also provide service to the remaining smaller communities and link the locally important traffic generators with the rural outskirts.

- ***Local Road System***

The local roads are all roads that are not on a higher system. Local residential subdivision streets and residential collector streets are elements of the local road system. Local residential streets include cul-de-sacs, loop streets less than 2,500 feet in length, or streets less than one mile in length. They do not connect thoroughfares or serve major traffic generators and typically do not collect traffic from more than one hundred dwelling units. Residential collectors serve as the connecting street system between local residential streets and the thoroughfare system.

Figure A-1 provides a schematic illustration of a functionally classified rural highway system. The functional classification of roads in Rowan County can be seen in the adopted plan.

Objectives of Thoroughfare Planning

Thoroughfare planning is the process public officials use to assure the development of the most appropriate street system to meet the existing and future travel desires within the area. The primary aim of a thoroughfare plan is to guide the development of the road system in a manner consistent with the changing traffic demands. Through proper planning for road development, costly errors and needles expense can be averted. A thoroughfare plan will enable road improvements to be made as traffic demands increase, and it helps eliminate unnecessary improvements, so needless expense can be averted. By developing the street system to keep pace with increasing traffic demands, maximum utilization of the system can be attained, requiring a minimum amount of land for street purposes.

In addition to providing for traffic needs, the thoroughfare plan should embody those details of good urban planning necessary to present a pleasing and efficient urban community. The location of present and future population, commercial, and industrial development affects major street and highway locations. Conversely, the location of major streets and highways within the urban area will influence the urban development pattern.

Other objectives of a thoroughfare plan include:

- providing for the orderly development of an adequate major street system as land development occurs,

- reducing travel and transportation costs,
- reducing the cost of major street improvements to the public through the coordination of the street system with private action,
- enabling private interests to plan their actions, improvements, and development with full knowledge of public intent,
- minimizing disruption and displacement of people and businesses through long range advance planning for major street improvements,
- reducing environmental impacts, such as air pollution, resulting from transportation, and
- increasing travel safety.

Operational Efficiency

A street's operational efficiency is improved by increasing the capability of the street to carry more vehicular traffic and people and goods. In terms of vehicular traffic, a street's capacity is defined by the maximum number of vehicles which can pass a given point on a roadway during a given time period under prevailing roadway and traffic conditions. Capacity is affected by the physical features of the roadway, nature of traffic, and the weather. There are several different approaches to increasing the capacity and reducing congestion on a roadway.

Physical ways to improve vehicular capacity include:

Street widening - Widening a street from two to four travel lanes, can more than double the capacity of the roadway because additional maneuverability for the traffic is provided.

Intersection improvements - Increasing the turning radii, adding exclusive turn lanes, and channeling conflicting traffic movements can improve the capacity of an existing intersection.

Improvements to vertical and horizontal alignment - These improvements can reduce the congestion caused by slow moving vehicles.

Elimination of roadside obstacles - This can reduce side friction and improve a driver's field of sight.

Operational ways to improve street capacity include:

Control of access - A roadway with complete access control can

often carry three times the traffic handled by a non-controlled access street with identical lane width and number.

Parking relocation - Relocating on-street parking to an off-street site increases capacity by providing additional street width for traffic flow and reducing the friction to traffic flow caused by parking and unparking vehicles.

One-way operation - The capacity of a street can sometimes be increased 20-50% depending upon turning movements and street width, by initiating one-way traffic operations. One-way streets also can improve traffic flow by decreasing potential traffic conflicts and simplifying traffic signal coordination.

Reversible lanes - Reversible traffic lanes may be used to increase street capacity in situations where heavy directional flows occur during peak periods or special events.

Signal phasing and coordination - Uncoordinated signals and poor signal phasing restrict traffic flow by creating excessive stop-and-go operation.

Altering travel demand is a third way to improve the efficiency of existing streets. Travel demand can be reduced or altered in the following ways:

Carpools - Encouraging people to form carpools and van pools for journeys to work and other trip purposes reduces the number of vehicles on the roadway and raises the people-carrying capability of the street system.

Alternate modes - Encouraging the use of alternate modes of travel such as transit, bicycles, or walking for short trips can reduce demand on the roadways.

Work hours - Encourage industries, businesses, and institutions to stagger work hours or establish variable work for employees. This will reduce travel demand in peak periods and spread peak travel over a longer period.

Land Use - Plan and encourage land use development or redevelopment in a more travel efficient manner

System Efficiency

Another means of altering travel demand is the development of a more efficient system of streets that will better serve travel desires. A more efficient system can reduce travel distances, time, and cost. Improvements in system efficiency can be achieved through the concept of functional

classification of streets and development of a coordinated major street system.

Application of Thoroughfare Planning Principles

The concepts presented in the discussion of operational efficiency, system efficiency, functional classification, and idealized major thoroughfare system are the conceptual tools available to the transportation planner in developing a thoroughfare plan. In actual practice, a thoroughfare plan is developed for established areas and is constrained by the existing land use and street patterns, existing public attitudes and goals, and current expectations of future land use. Compromises must be made because of these constraints and the many other factors that affect major street locations.

Throughout the thoroughfare planning process it is necessary from a practical viewpoint that certain basic principles be followed as closely as possible. These principles are as follows:

The plan should be derived from a thorough knowledge of today's travel - its component parts, as well as the factors that contribute to it, limit it, and modify it.

Traffic demands must be sufficient to warrant the designation and development of each major road. The transportation plan should be designed to accommodate a large portion of all major traffic movements on a relatively few roads.

The plan should conform to and provide for the land development plan of the area.

Certain considerations must be given to development beyond the current planning period. Particularly in outlying or sparsely developed areas which have development potential, it is necessary to designate thoroughfares on a long-range planning basis to protect rights of way for future thoroughfare development.

While being consistent with the above principles and realistic in terms of travel trends, the plan must be economically feasible.

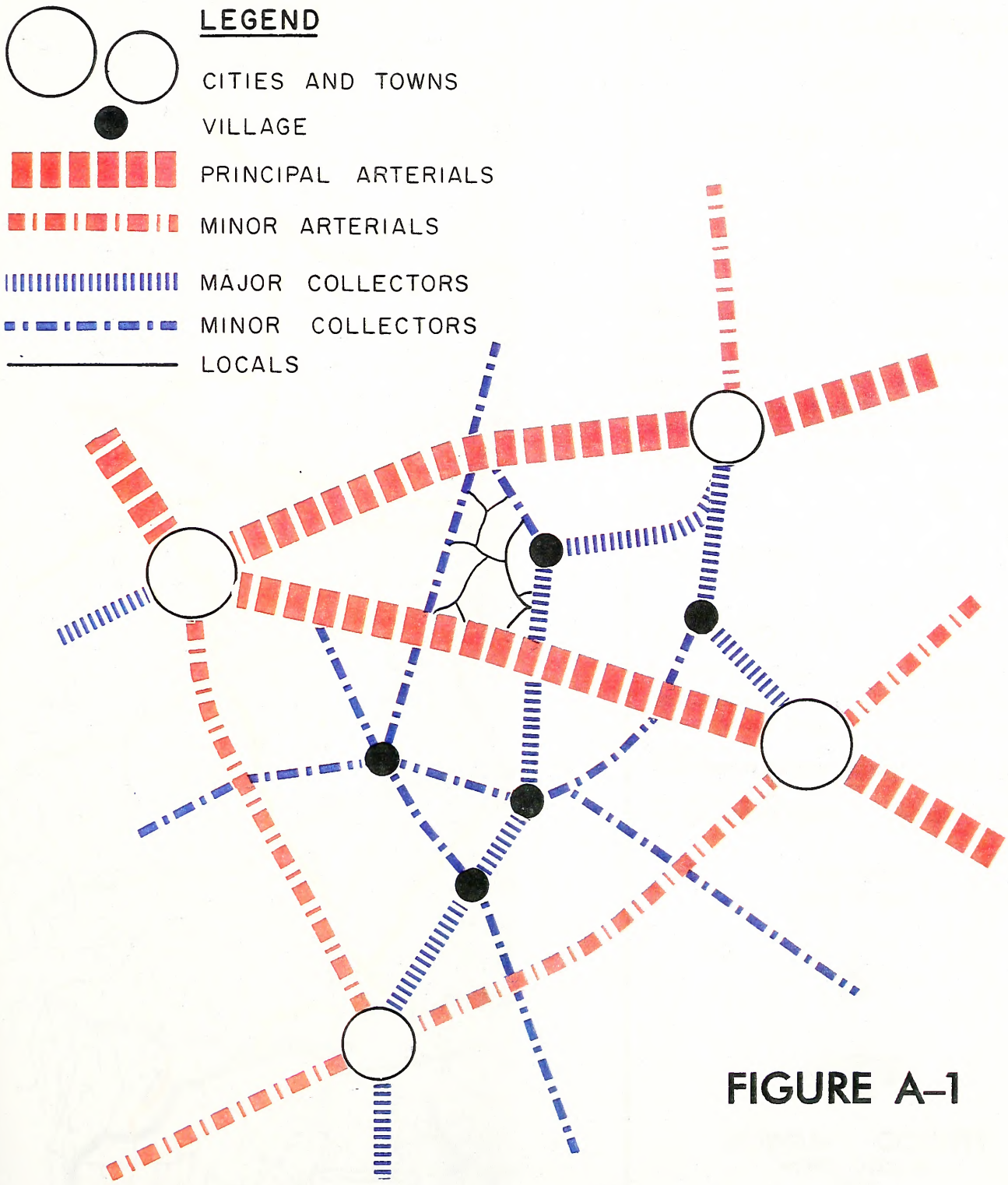
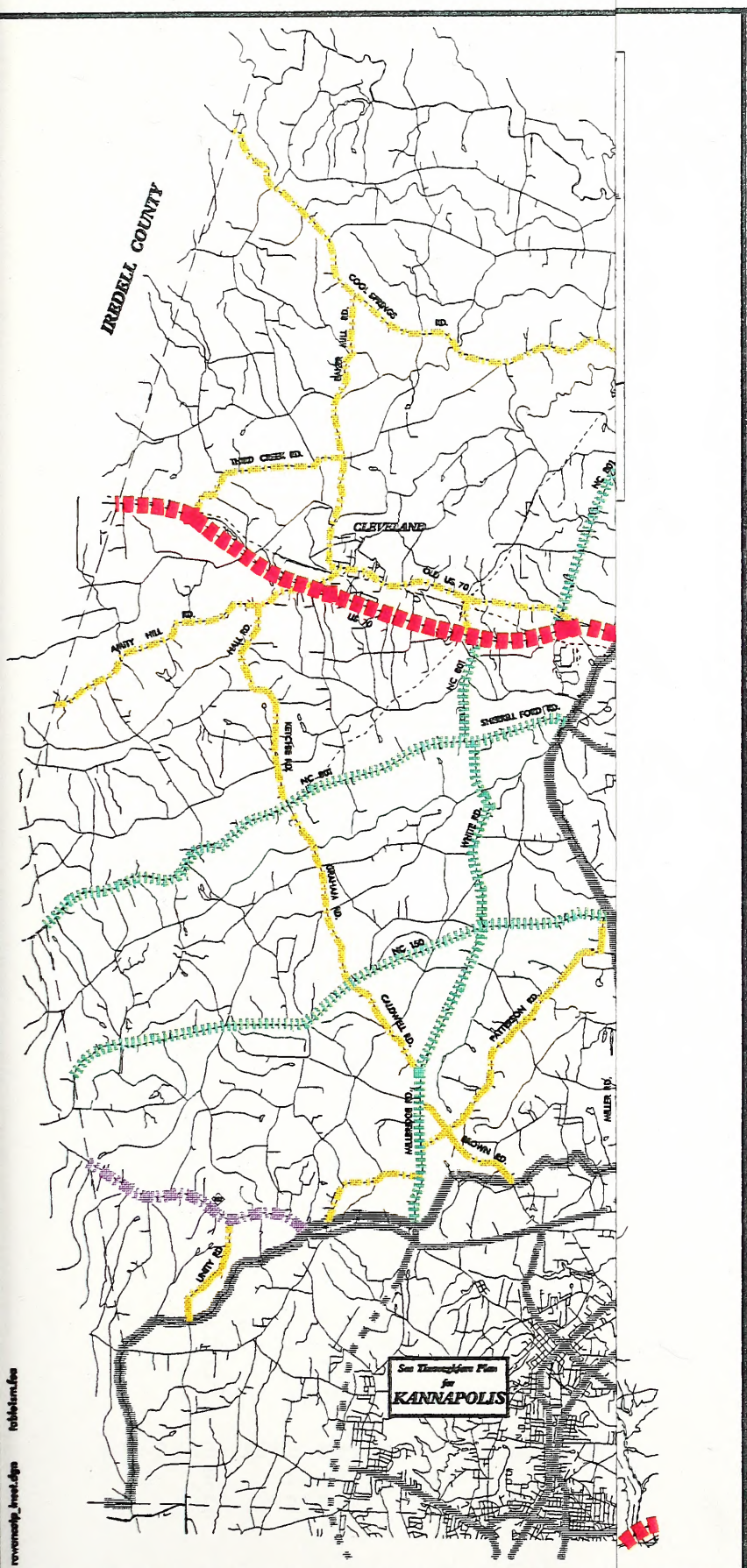
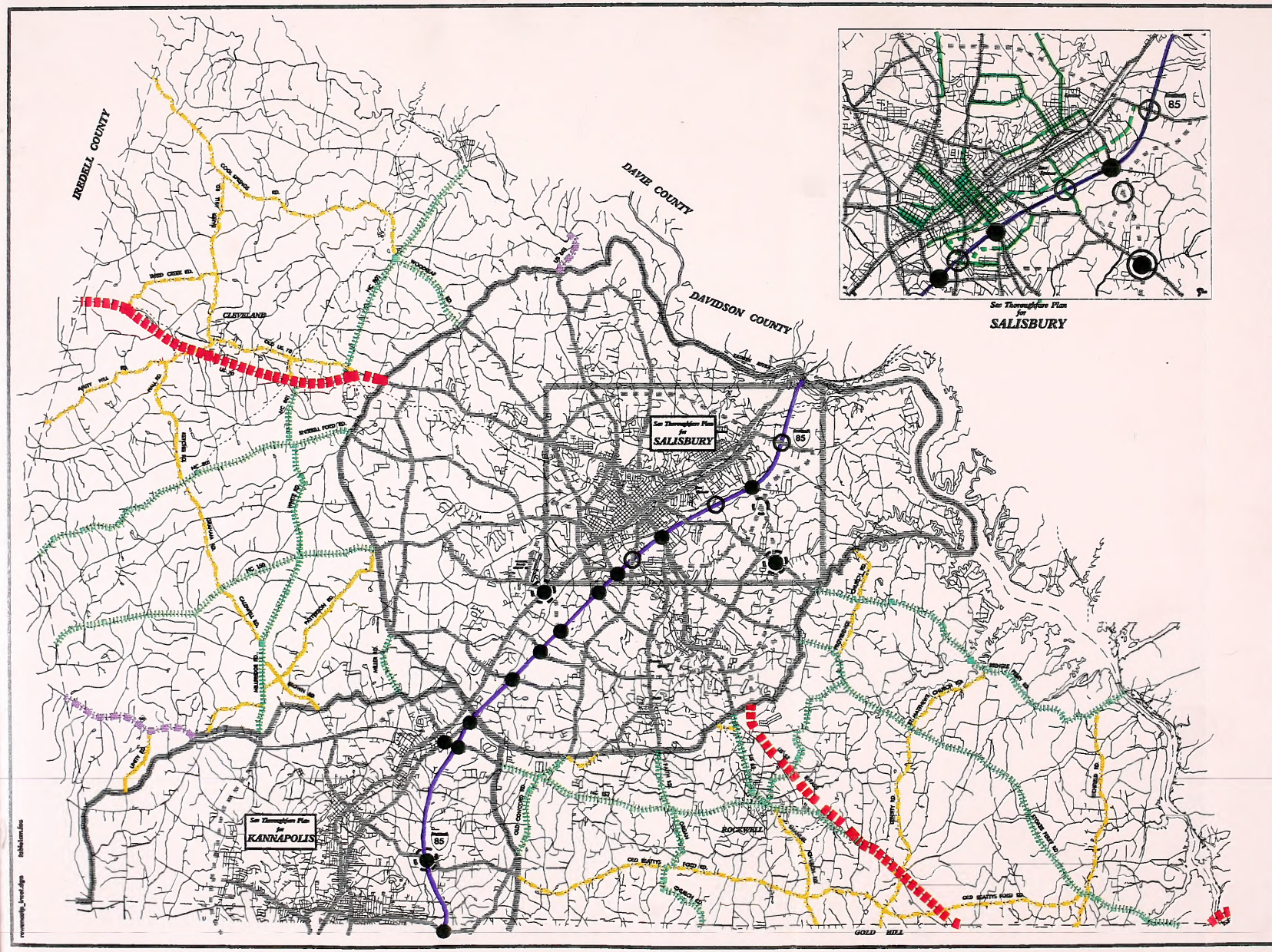


FIGURE A–1

SCHEMATIC ILLUSTRATION
OF FUNCTIONALLY CLASSIFIED
RURAL HIGHWAY NETWORK


IREDELL COUNTY
CLEVELAND
OLD US 70
US 70
NC 801
NC 150
NC 150
NC 801
NC 801
NC 801



FUNCTIONAL CLASSIFICATION FOR ROWAN COUNTY

FIGURE A-2

LEGEND

	existing	proposed
PRINCIPAL ARTERIAL		
MINOR ARTERIAL		
MAJOR COLLECTOR		
MINOR COLLECTOR		
URBAN FREEWAY		
URBAN MAJOR THOROUGHFARE		
URBAN MINOR THOROUGHFARE		
PLANNING AREA BOUNDARY		
INTERCHANGE		
GRADE SEPARATION		

ADOPTED BY:

COUNTY OF ROWAN	APRIL 19, 1999
TOWN OF CLEVELAND	MAY 10, 1999
TOWN OF ROCKWELL	MAY 10, 1999
NCDOT STATEWIDE PLANNING BRANCH	MAY 14, 1999
NC DEPARTMENT OF TRANSPORTATION	SEPTEMBER 24, 1999

MAP DATE
APRIL 19, 1999

N

ROWAN COUNTY
NORTH CAROLINA

PREPARED BY THE
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DIVISION OF HIGHWAYS - GIS UNIT
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U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALE

1 0 1 2 3 4
Miles

APPENDIX B

RELATED THOROUGHFARE PLANS AND PROJECTS

In addition to county thoroughfare plans, plans are adopted for the urban areas in North Carolina. To obtain maximum efficiency from both plans, the municipalities and the counties must work together to develop the thoroughfare system in their areas.

Urban Transportation Plans

In Rowan County a thoroughfare plan was adopted for the Salisbury urban area in 1996. The urban area includes the City of Salisbury and the Towns of Spencer, East Spencer, Granite Quarry, and Faith. See Figure B-1.

In 1996 a thoroughfare plan was mutually adopted for the Cabarrus-South Rowan Urban Area. It straddles the Cabarrus County line and includes the Cities of Kannapolis and Concord and the Towns of China Grove, Landis, and Harrisburg. See Figure B-2.

Transportation Improvement Program Projects

The Transportation Improvement Program (TIP) is a seven-year project document that lists the major transportation improvement projects that the Department of Transportation has planned to accomplish. These projects include not only roadway projects, but also bridge projects, railroad crossings, bicycle facilities, and public transportation. Rowan County has a considerable number of projects listed in the 2000 - 2006 TIP. Here is a list of major projects:

I-2304 I-85 widening, 6.8 MI, Exit 81 to Exit 87

D	In Progress	
RW	2002	$ 5628000
C	2004	$63492000
C	PY	$21164000

I-2511 I-85 widening, 13.2 MI, Exit 68 to Exit 81

D	In Progress	
C	2000	$47171000
C	2000	$44277000

R-2903 US52 relocation, 19.2 MI, NC 49 to I-85

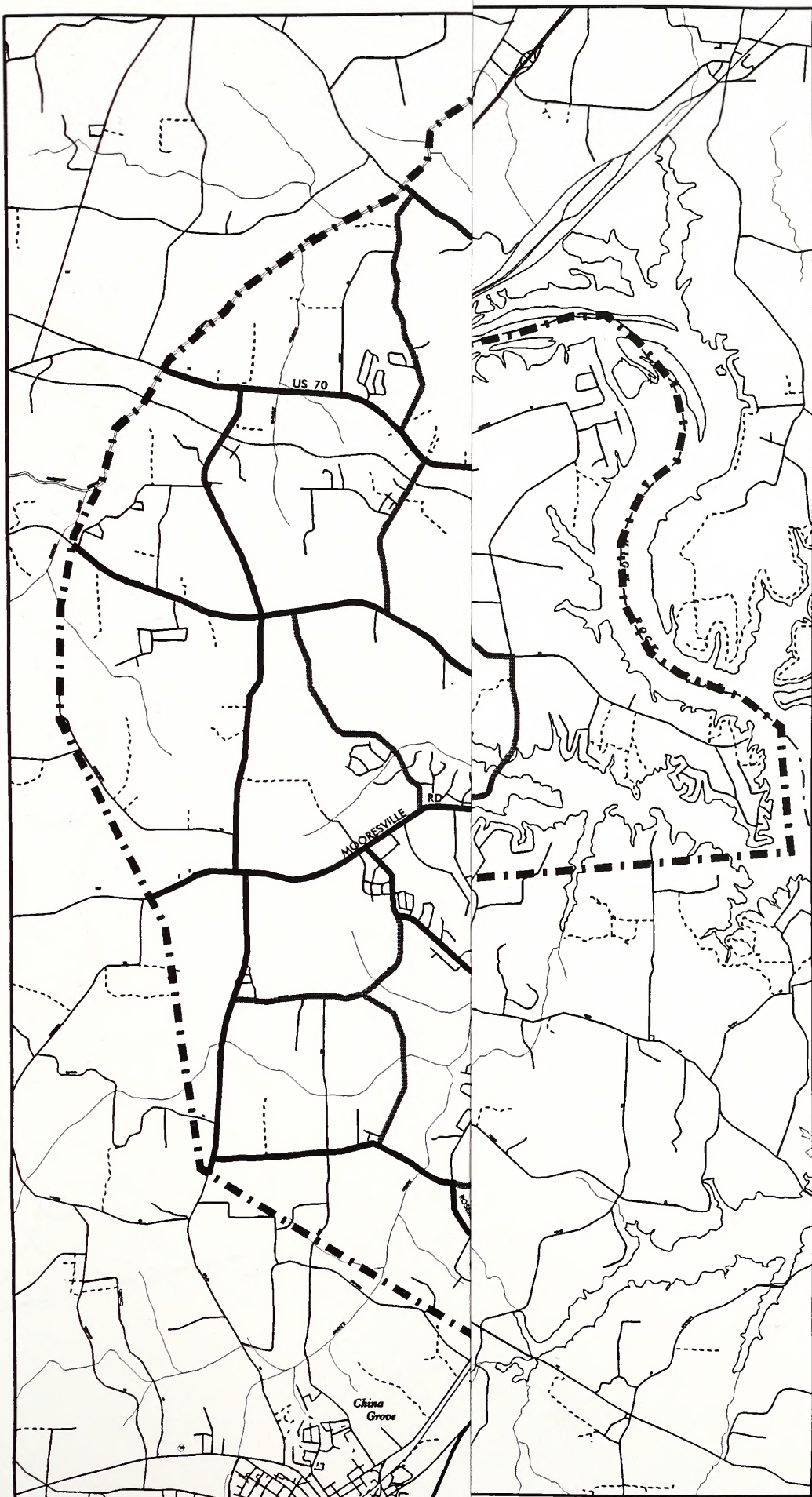
P	In Progress
D	2001

RW	2005	$ 7355000
RW	PY	$54410000

R-2911 US70 widening, 19.7 MI, Statesville to Us 601

D	In Progress	
RW	2000	$12845000
C	2002	$61792000
RW	PY	$06002000
C	PY	$13961000

The addition of a project to the TIP represents only a commitment to provide improvements. Detailed project studies and environmental impact statements, that include public participation, must be performed so the best improvement can be determined for each project.



REVISIONS:	
ROWAN CO	APRIL 19, 1999
TOWN OF CLEVELAND	
TOWN OF ROCKWELL	
SALISBURY	
SPENCER	
EAST SPENCER	
GRANITE QUARRY	
FAITH	
STATEWIDE PLANNING BRANCH	JUNE 15, 1999
NC DEPT OF TRANSPORTION	JULY 9, 1999

ADOPTED BY:

SALISBURY March 19, 1996
SPENCER December 12, 1995
EAST SPENCER January 10, 1996
GRANITE QUARRY July 1, 1996
FAITH December 12, 1995
ROWAN COUNTY May 15, 1996

RECOMMENDED BY:

NC DOT STATEWIDE PLANNING BRANCH July 29, 1996

ADOPTED BY:

NC DEPT OF TRANSPORTION October 4, 1996

PUBLIC HEARINGS:

ROWAN COUNTY November 14, 1995
SALISBURY February 20, 1996

FIGURE B–1

LEGEND

	Existing	Proposed
Freeway		
Major Thoroughfare		
Minor Thoroughfare		
Planning Area Boundary		
Interchange		
Grade Separation		

THOROUGHFARE PLAN

SALISBURY

SPENCER
EAST SPENCER
GRANITE QUARRY
FAITH

Rowan County
North Carolina

PREPARED BY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Division of Highways Statewide Planning Branch
IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

N

2000 0 2000 4000 6000
scale in feet

November 20, 1995

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RW	2005	$ 7355000
RW	PY	$54410000

R-2911 US70 widening, 19.7 MI, Statesville to Us 601

D	In Progress	
RW	2000	$12845000
C	2002	$61792000
RW	PY	$06002000
C	PY	$13961000

The addition of a project to the TIP represents only a commitment to provide improvements. Detailed project studies and environmental impact statements, that include public participation, must be performed so the best improvement can be determined for each project.

REVISIONS:	
ROWAN CO	APRIL 19, 1999
TOWN OF CLEVELAND	
TOWN OF ROCKWELL	
SALISBURY	
SPENCER	
EAST SPENCER	
GRANITE QUARRY	
FAITH	
STATEWIDE PLANNING BRANCH	JUNE 15, 1999
NC DEPT OF TRANSPORTION	JULY 9, 1999

ADOPTED BY:

SALISBURY March 19, 1996
SPENCER December 12, 1995
EAST SPENCER January 10, 1996
GRANITE QUARRY July 1, 1996
FAITH December 12, 1995
ROWAN COUNTY June 18, 1996

RECOMMENDED BY
NC DOT STATEWIDE PLANNING BRANCH July 29, 1996

APPROVED BY
NC DEPT OF TRANSPORTION October 4, 1996

PUBLIC HEARINGS:

ROWAN COUNTY November 14, 1995
SALISBURY February 20, 1996

FIGURE B-1

LEGEND

	Existing	Proposed
Freeway		
Major Thoroughfare		
Minor Thoroughfare		
Planning Area Boundary		
Interchange		
Grade Separation		

THOROUGHFARE PLAN

SALISBURY

SPENCER
EAST SPENCER
GRANITE QUARRY
FAITH

Rowan County
North Carolina

PREPARED BY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Division of Highways Statewide Planning Branch
IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

N

2000 0 2000 4000 6000
scale in feet

November 20, 1995

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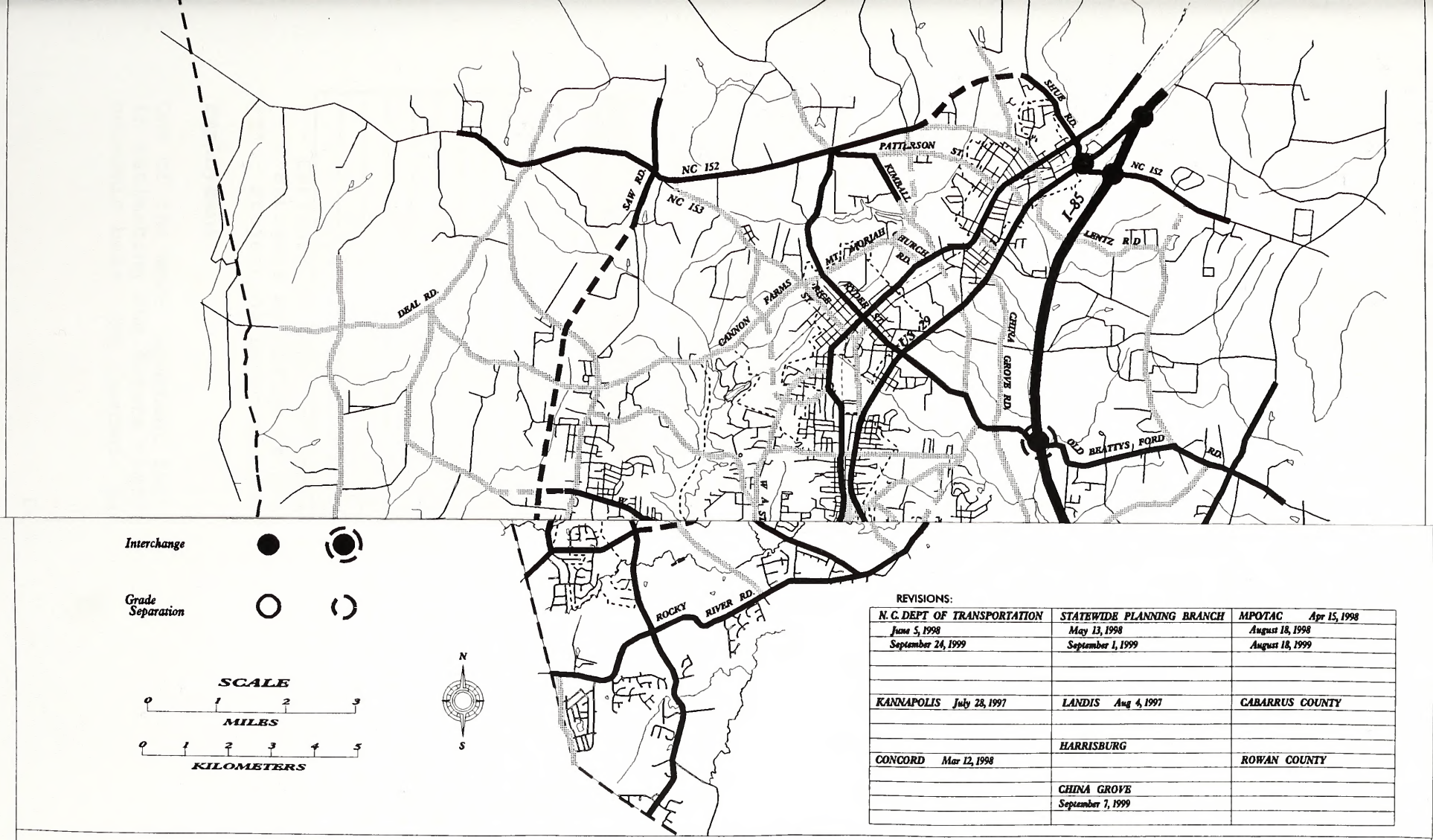

REVISIONS:

N. C. DEPT OF TRANSPORTATION	STATEWIDE PLANNING BRANCH	MPO/TAC Apr 15, 1998
June 5, 1998	May 13, 1998	August 18, 1998
September 24, 1999	September 1, 1999	August 18, 1999
KANNAPOLIS July 28, 1997	LANDIS Aug 4, 1997	CABARRUS COUNTY
	HARRISBURG	
CONCORD Mar 12, 1998		ROWAN COUNTY
	CHINA GROVE	
	September 7, 1999	

ADOPTED BY:

KANNAPOLIS	March 25, 1996
CONCORD	March 14, 1996
CHINA GROVE	March 5, 1996
LANDIS	March 4, 1996
HARRISBURG	March 11, 1996
CABARRUS COUNTY	March 19, 1996
ROWAN COUNTY	March 7, 1996

RECOMMENDED BY:

STATEWIDE PLANNING May 17, 1996

N. C. DEPT OF TRANSPORTATION June 7, 1996

TRANSPORTATION ADVISORY COMMITTEE April 24, 1996

THOROUGHFARE PLAN

MAP DATE
FEBRUARY 21, 1996

FIGURE B–2

CABARRUS – SOUTH ROWAN

CABARRUS COUNTY
ROWAN COUNTY
NORTH CAROLINA

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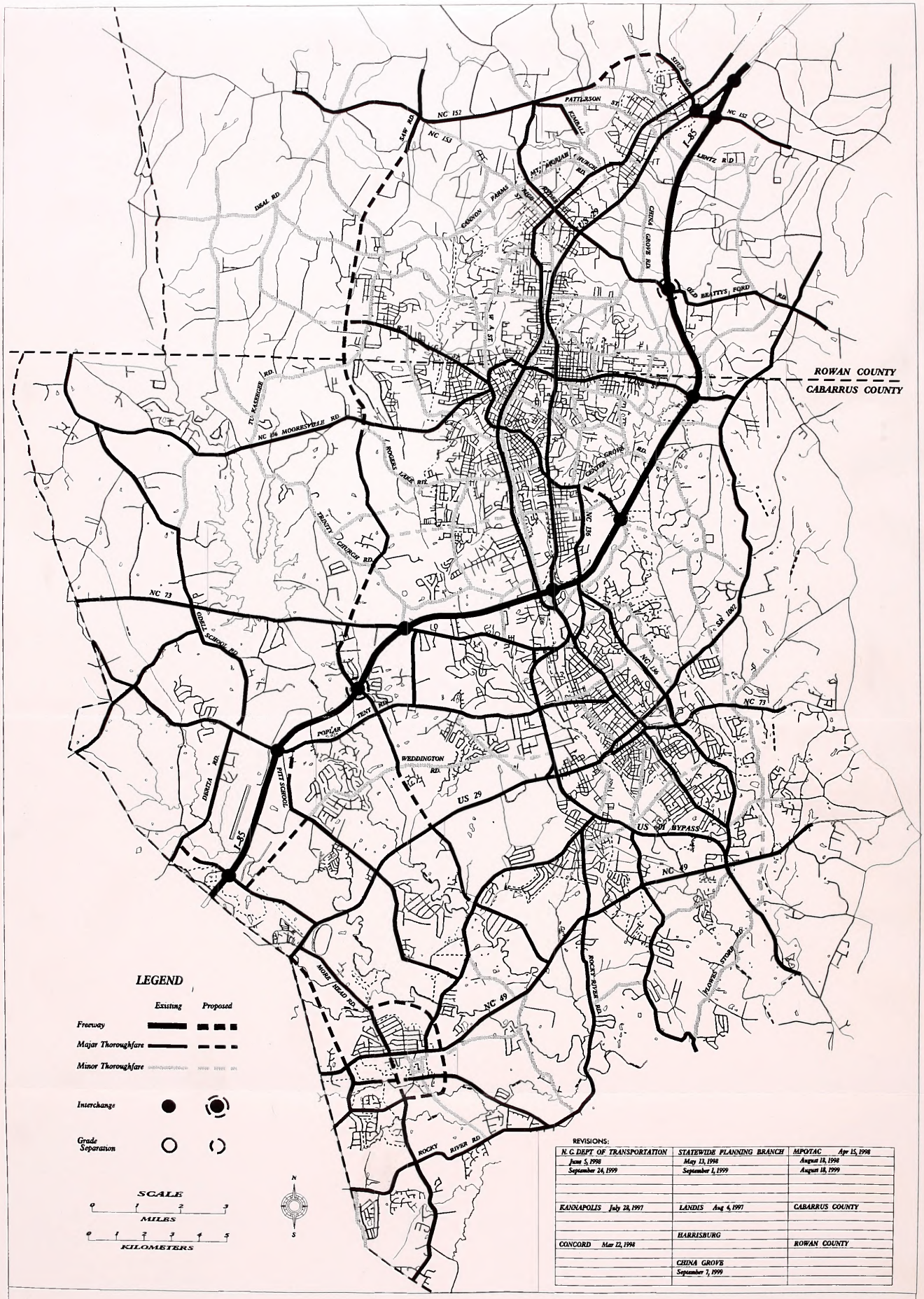
U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION



REVISIONS:

N. C. DEPT OF TRANSPORTATION	STATEWIDE PLANNING BRANCH	MPO/TAC Apr 15, 1998
June 5, 1998	May 13, 1998	August 18, 1998
September 24, 1999	September 1, 1999	August 18, 1999
KANNAPOLIS July 28, 1997	LANDIS Aug 4, 1997	CABARRUS COUNTY
	HARRISBURG	
CONCORD Mar 12, 1998		ROWAN COUNTY
	CHINA GROVE	
	September 7, 1999	

ADOPTED BY:

KANNAPOLIS	March 25, 1996
CONCORD	March 14, 1996
CHINA GROVE	March 5, 1996
LANDIS	March 4, 1996
HARRISBURG	March 11, 1996
CABARRUS COUNTY	March 19, 1996
ROWAN COUNTY	March 7, 1996

RECOMMENDED BY:

STATEWIDE PLANNING May 17, 1996

N. C. DEPT OF TRANSPORTATION June 7, 1996

TRANSPORTATION ADVISORY COMMITTEE April 24, 1996

THOROUGHFARE PLAN

MAP DATE
FEBRUARY 21, 1996

FIGURE B–2

CABARRUS – SOUTH ROWAN

CABARRUS COUNTY
ROWAN COUNTY
NORTH CAROLINA

PREPARED BY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH
IN COOPERATION WITH THE
U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPENDIX C

FATORS AFFECTING THE FUTURE ROAD SYSTEM

The objective of thoroughfare planning is to develop a transportation system that will meet future travel demand and enable people and goods to travel safely and economically. To determine the needs of an area, it is important to understand the role of population, the economy, and land use have on the highway system. Examination of these factors help to explain historic travel patterns and lays the groundwork for thoroughfare planning.

Population

The amount of traffic on a section of roadway is a function of the size and location of the population which it serves. Investigating past trends in population growth and forecasting future population growth and dispersion is one of the first steps for a transportation planner. Table C-1 shows population trends for Rowan County.

Table C-1
Rowan County Population Forecasts

Year	Population	Percent Change
1950	75410*	
1960	82817*	+0.94
1970	90035**	+0.84
1980	99186**	+0.97
1990	110605**	+1.10
1995	118757**	+1.43
2000	127595**	+1.45
2010	141998**	+1.08
2020	156886**	+1.00
2025	161061***	+0.53

* - Estimate by Dept. of Administration
** - Estimate by Office of State Planning
*** - Projection based on past trends

Employment

One of the more important factors that should be considered in estimating the future traffic growth of an area is its economic base. The economic base determines the employment

type, size, and commuter traffic patterns around the county. The number of employers and the employee's income or purchasing power influences how much population can be supported in the area. Figure C-1 shows the projected growth in both dwelling units and employment for the four major areas in the county.

Vehicle Registration

Generally, as a family income increases so does the number of vehicles owned, as well as the number of vehicle trips generated per day by each household. Since 1950 the number of registered vehicles in the county has increased at a greater rate than the population. This means that there are more vehicles available per person. Table C-2 shows a comparison between the trend in persons per vehicle in Rowan County and in North Carolina. The table includes past and projected ratios. The ratio is obtained by dividing the total population of the area by the total number of vehicles registered in that area. The decreasing trend means that automobiles are carrying fewer people than in the past for every trip they make.

Table C-2
Persons per Vehicle Trends

Year	Rowan County	North Carolina
1950	3.04	3.47
1960	2.66	2.67
1970	1.97	2.03
1980	1.27	1.52
1990	1.13	1.35
1995*	1.08	N/a
2000*	1.06	1.24
2010*	1.03	1.15
2020*	1.01	1.11
2025*	1.00	1.09

* estimated

Travel Demand

Average annual daily traffic volumes (AADT) for 1995 on selected major roads in Rowan County are shown in Figure C-2. Also shown are projections for the year 2025, assuming no changes to the existing street system are made. These projections were based on historic and anticipated population, economic growth patterns, and land use trends. Also shown on Figure C-2 is the practical capacity for those same locations for comparison purposes. Appendix H contains an explanation of these terms.

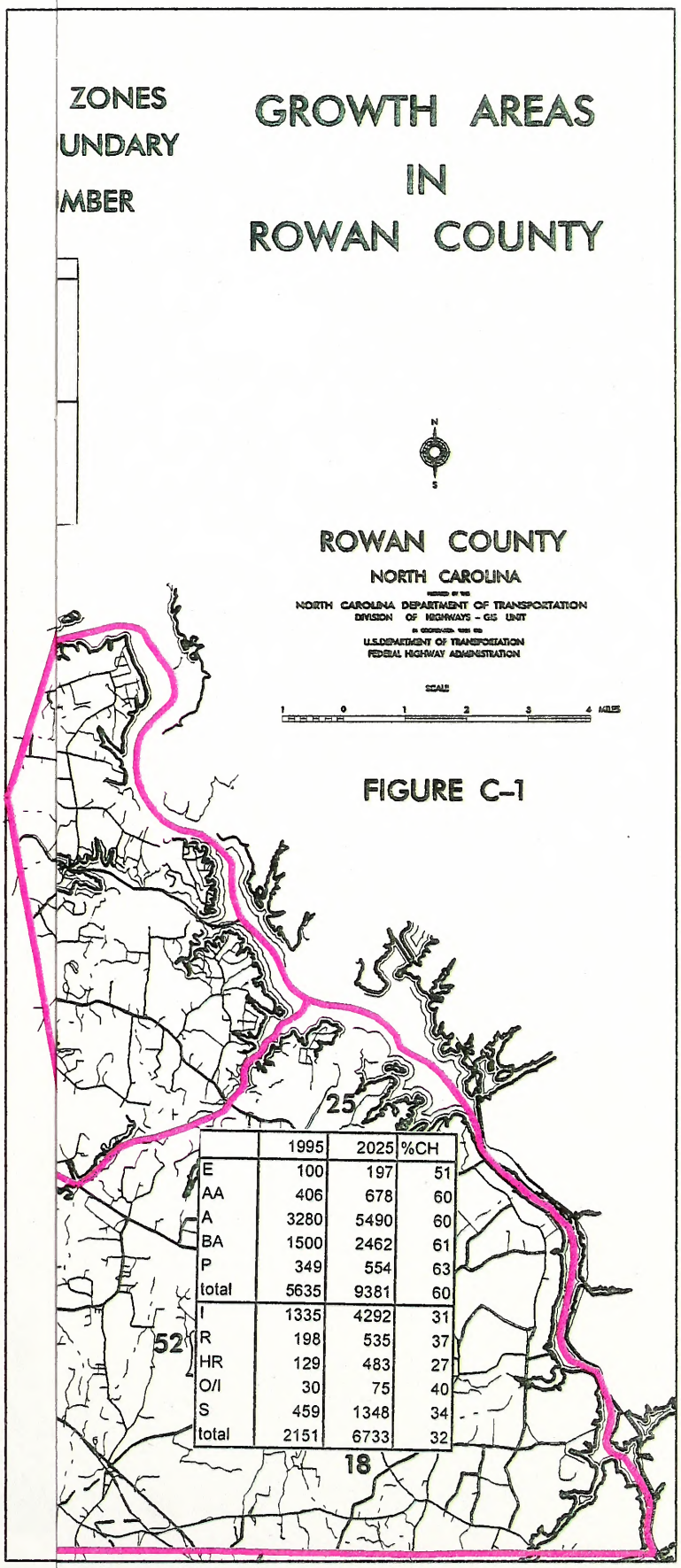


FIGURE C-1

	1995	2025	%CH
E	100	197	51
AA	406	678	60
A	3280	5490	60
BA	1500	2462	61
P	349	554	63
total	5635	9381	60
I	1335	4292	31
R	198	535	37
HR	129	483	27
O/I	30	75	40
S	459	1348	34
total	2151	6733	32

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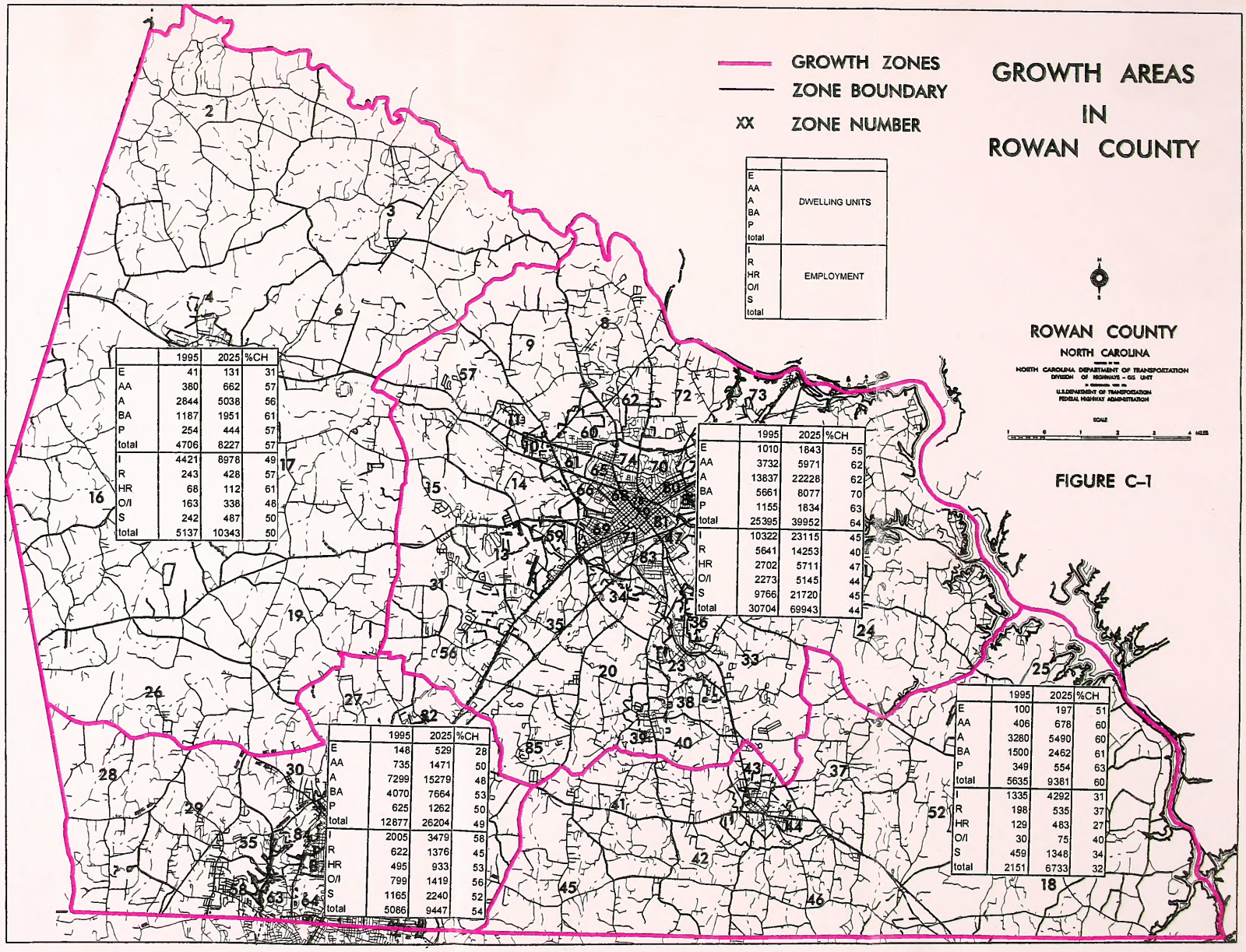

	1995	2025	%CH
E	41	131	31
AA	380	662	57
A	2844	5038	56
BA	1187	1951	61
P	254	444	57
total	4706	8227	57
I	4421	8978	49
R	243	428	57
HR	68	112	61
O/I	163	338	48
S	242	487	50
total	5137	10343	50

	1995	2025	%CH
E	1010	1843	55
AA	3732	5971	62
A	13837	22228	62
BA	5661	8077	70
P	1155	1834	63
total	25395	39952	64
I	10322	23115	45
R	5641	14253	40
HR	2702	5711	47
O/I	2273	5145	44
S	9766	21720	45
total	30704	69943	44

	1995	2025	%CH
E	148	529	28
AA	735	1471	50
A	7299	15279	48
BA	4070	7664	53
P	625	1262	50
total	12877	26204	49
I	2005	3479	58
R	622	1376	45
HR	495	933	53
O/I	799	1419	56
S	1165	2240	52
total	5086	9447	54

	1995	2025	%CH
E	100	197	51
AA	406	678	60
A	3280	5490	60
BA	1500	2462	61
P	349	554	63
total	5635	9381	60
I	1335	4292	31
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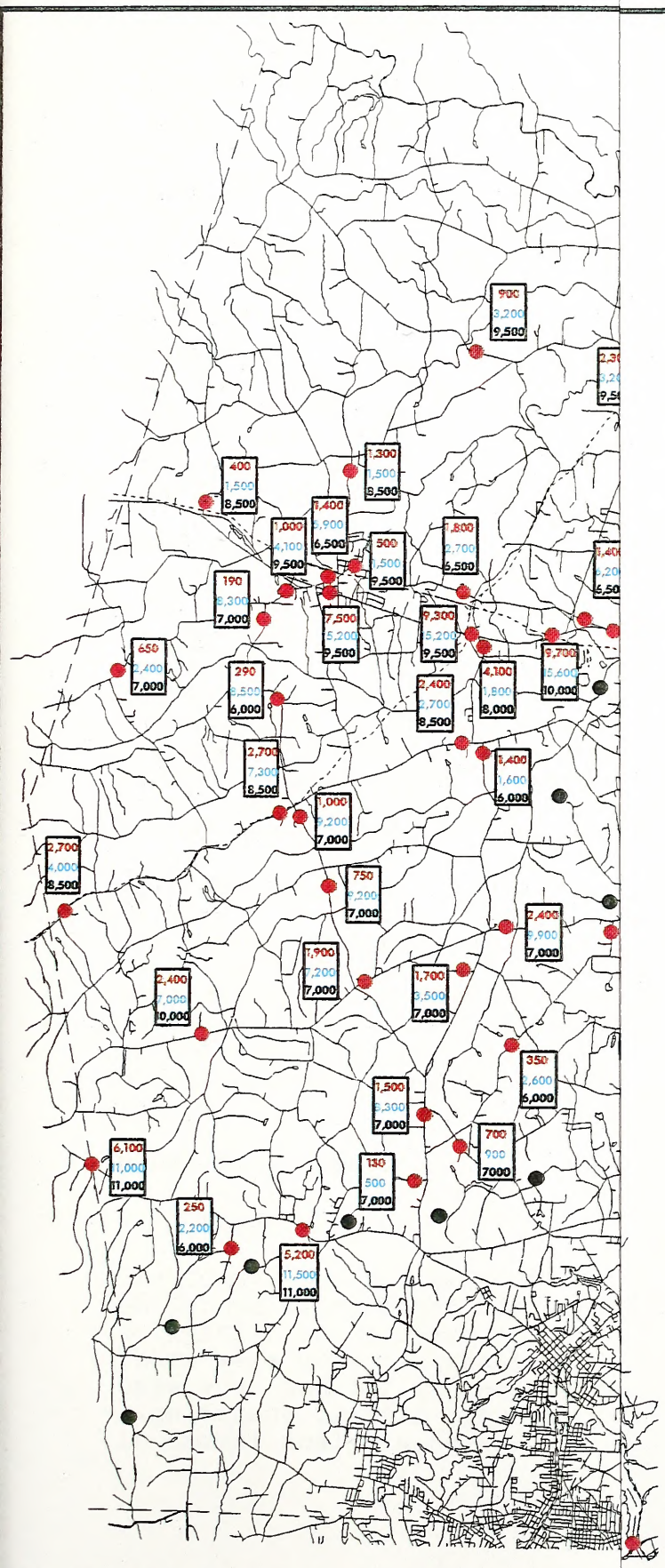

ROWAN COUNTY

1995 TRAFFIC AND 2025 FORECASTED TRAFFIC WITH EXISTING ROADWAY CAPACITIES

● COUNT LOCATION

0000 1995 ADT

0000 2025 FORECASTED ADT

0000 ROADWAY CAPACITY

FIGURE C-2

MAP DATE
APRIL 19, 1999

N
S

ROWAN COUNTY
NORTH CAROLINA

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS - GIS UNIT
IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALES

1 0 1 2 3 4
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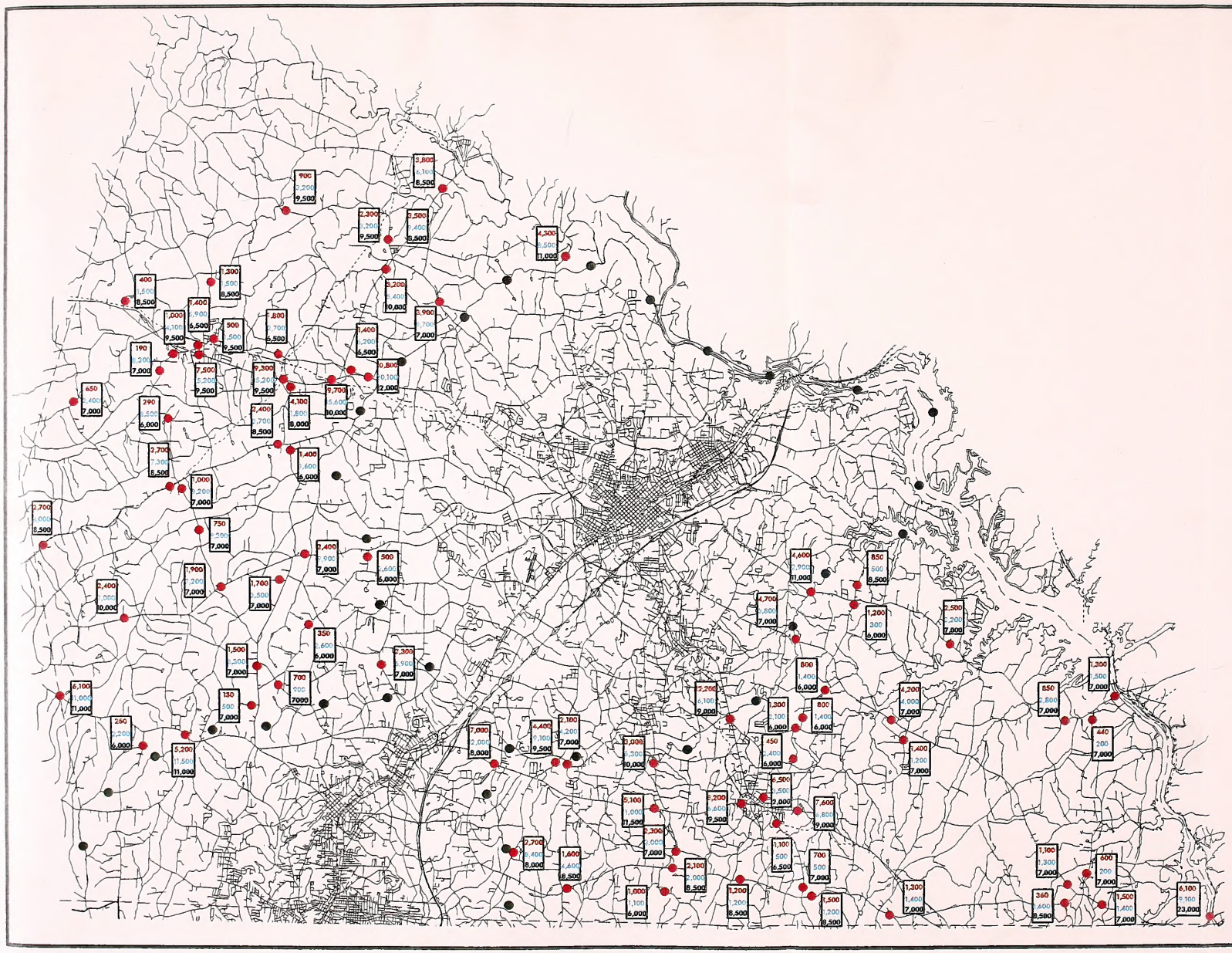

ROWAN COUNTY

1995 TRAFFIC AND 2025 FORECASTED TRAFFIC WITH EXISTING ROADWAY CAPACITIES

● COUNT LOCATION

0000 1995 ADT

0000 2025 FORECASTED ADT

0000 ROADWAY CAPACITY

FIGURE C-2

MAP DATE
APRIL 19, 1999

ROWAN COUNTY
NORTH CAROLINA

PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS - GIS UNIT
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FEDERAL HIGHWAY ADMINISTRATION

SCALE

APPENDIX D

MODELING, FORECASTING AND ANALYSIS

In the past, county thoroughfare plan studies have used existing traffic counts taken on the roads around the county and then projected that traffic to the future using average growth rates and a simple trendline analysis. For this study of Rowan County's thoroughfare plan, a computer model was generated to simulate the traffic patterns around the county.

Data Collection

Dwelling Units

The number of dwelling units in each zone was obtained from county census data and from county tax maps and information. The dwelling units were stratified into five categories according to their trip making ability. The categories used were excellent, above average, average, below average, and poor. Table D-9 lists the base year 1995 dwelling units in Rowan County used for this study by category.

Employment

The number of employees in each traffic zone was compiled from the Employment Security Commission listings. Employees were divided into five categories according to their Standard Industrial Code (SIC). Commercial vehicles were also counted by zone. Table D-10 lists the base year 1995 employment by SIC groupings used for this study.

Model Development

Planning Area

The County was divided into 91 traffic analysis zones based on Census Block Numbering Areas for the purposes of data collection and projection to the future. See Figure D-1. There were also 127 stations used around the boundary in the base year and 131 in the future year, marking where significant traffic carriers crossed the county line for use in travel analysis in and out of the county.

Base Year Network

The purpose of a traffic model is to duplicate the conditions out on the area road system. The base year road network was generated from the Bureau of Census TIGER files for Rowan County. Those major facilities that had been built between 1990 and 1995 were added to the network. Individual characteristics of each road were collected such as lane widths, number of lanes, speed limits, traffic signal locations, and segment lengths. All of these were entered into the model. Another important characteristic of the base year is the amount of existing traffic out on the roads on the network. Traffic counts were taken at select locations throughout the county. Other key locations were filled in with 1995 traffic average daily traffic counts (ADTs).

Base Year 1995 Trip Generation

Different vehicles, and different drivers, make different types of trips and different numbers of trips. A section of road may contain vehicles making one of the many types of Internal-Internal types of trips, External-Internal trips, or External-External trips.

Internal-Internal trips are trips with both ends occurring inside the planning area. Average weekday trips produced inside the area were divided into those produced by dwelling units, by commercial cars, and by trucks. Those trips produced by residents in the area's dwelling units are a function of the number and type of housing stock in each of the 91 analysis zones. Table D-1 lists the trip generation rates per dwelling type in trips per day. Commercial cars and trucks had generation rates of 6.7 vehicle trips per day.

Table D-1
Trip Generation Rates per Dwelling Type
(Trips per Day)

Year		Above		Below		Overall
	Excellent	Average	Average	Average	Poor	Average
1995	10.5	9.0	7.3	6.0	4.0	7.0
2025	10.9	9.4	7.7	6.4	4.4	7.51

The internal trips were reduced by 20% to reflect trips made by vehicles garaged inside the planning area but with destinations outside the area which would then be accounted for in cordon station counts. The rest of the internal trips were divided into three trip purposes: home-based work (HBW) at 22% of Internal, Other home-based (OHB or HBO) at 52%, and non-home based at 26%. Those non-home based trips generated by vehicles garaged outside the planning area are added back to the internal trips. The secondary non-home based trips,

18700, were estimated using the following equation:

Secondary = (Total Ext-Int Trips) - Ext-Int Trips Garaged x 0.30
NHB Trips Inside Planning Area

External-Internal trips are those trips in which one end occurs outside the planning area. The trips are considered produced at any one of the 27 external stations and attracted to the internal zones based on the employment and housing located there.

External-External, or thorough, trips are those which do not stop within the planning area but travel through it from one station to another station along some path. These trips are accounted for by the external station counts. Table D-7 lists each station and the number of trips for each trip type.

Base Year 1995 Trip Attractions

Trip attractions for each internal trip purpose are based on each zone's relative `attractiveness' which is calculated as a function of its amount and type of employment. Each zone has an estimated number of trips produced and attracted for each of the three internal trip purposes. Zonal productions and attractions were developed using a computer program designed by the North Carolina Department of Transportation called `Internal Data Summary'. Using given occupation rates and trip generation rates productions are calculated from dwelling units, trucks, and cars. This program also uses a multiple regression equation, based on an analysis by Dr. Leftwich, to develop the attraction data using factors corresponding to the different employment types. Coefficient data for the equations are borrowed from studies of areas similar in size and nature. Each equation is applied to all the zones in the planning area. Occasionally there are some zones that contain special generators or attractors such as a regional hospital or shopping mall that must be compensated for in the analysis. This was done by adding an additional employment factor to the equation, but only for those zones. This was used only for calibration purposes.

In the internal data summary for Rowan County the HBW trip attractions were equal the total employment for each zone. The total attractions were balanced to equal total productions by purpose throughout the area. The coefficients for the other purposes appear in Table D-2. A list of the number of employees in each zone, by grouping, for the base year of 1995 appears in Table D-10.

The generic regression equation is:

$$Y = aX_1 + bX_2 + cX_3 + dX_4 + eX_5 + fX_6 + gX_7 + hX_{12}$$

where,

X_1 = Industrial Employment SIC # 1-49
X_2 = Retail Employment SIC # 50-54,56,57,59
X_3 = Highway Retail Employment SIC # 55, 58
X_4 = Office & Institutional Employment SIC # 60-67, 91-97
X_5 = Service Employment SIC # 70-76, 78-89,99
X_6 = Extra Retail Employment SIC # 50-54, 56, 57, 59
X_7 = Mall or Large Shopping Employment SIC # 50-54, 56, 57,59
X_{12} = Dwelling Units

Table D-2
Attraction Coefficients

Purpose	a	b	c	d	e	h
HBO	0.04	0.77	7.50	0.80	1.90	1.05
NHB	0.09	1.53	2.28	0.43	0.62	0.27
EXT-INT	0.50	1.00	1.31	0.41	0.56	0.52

Base Year 1995 Trip Distribution and Assignment

The Gravity Model was used to distribute the internal trips to each traffic zone using friction and trip length frequency factors shown in Table D-8. The Gravity Model is based on the concept that trips from zone I to zone j equals the number of trips produced at zone I times the ratio of the attractiveness of zone j to the attractiveness of all zones.

Base Year Network Accuracy Checks

The next step was to calibrate the model to existing conditions. This was done using an all or nothing loading of the land use information onto the network. The assigned traffic was then compared to the existing ground counts that had been collected throughout the County. An important part of model calibration is the screenline check. A screenline is an imaginary line drawn through or around a planning area. Traffic counts are taken on every road that crosses these lines. The volumes on each screenline are summed up and compared to the sum of the volumes in the model taken at the same locations. This indicates if the total amount of traffic on the network is close to the existing conditions. See Table D-3.

Future Year 2025 Travel

The 1995 land use data was projected to the design year of 2025 in the same format as before. The station volumes were also projected to 2025 using historic trends and adjusted for expected development near the county line. The future through trips, external-internal trips, and secondary NHB trips were determined by the same method as the 1995 numbers.

See Table D-7. There were an estimated 18300 secondary NHB trips for 2025. The data was then loaded into the internal data summary program and the network model. The results were analyzed for deficiencies.

Table D-3 Screenline Check			
Line #	**Actual Count**	**Model Volume**	**Percent Accuracy**
1	7590	7701	1.01
2	79085	115022	1.45
3	9130	10491	1.15
4	75159	78896	1.05
5	42865	67324	1.57
Total	986775	1138982	1.15

System Deficiencies

Capacity Deficiency Analysis

Capacity is defined as the maximum number of vehicles, under prevailing roadway and traffic conditions, that have a reasonable expectation of passing over a given time period. A comparison of capacity with actual traffic volumes is a good indicator of the adequacy of the existing major street network. See Figure D-2.

High Accident Locations

Traffic accidents are often used as an indicator for locating congestion problems. Traffic accident records can also be reviewed to identify problem locations or deficiencies like poor design, inadequate signing, ineffective parking, or poor sight distance. Accident patterns developed from analysis of accident data can lead to improvements that will reduce the number of accidents as a whole.

Table D-4 gives a summary of all the accidents that occurred in the rural portion of Rowan County between January 1996 and December 1998. This table only includes locations with 10 or more accidents. The accidents reported also occurred within 200 feet of the intersection during the study period indicated. The severity listed is the average accident severity for that location. Both the severity and number of accidents should be considered when investigating accident data. The severity of every accident is measured with a series of weighting factors developed by NCDOT. In terms of these factors, a fatal or incapacitating accident is 47.7 times more severe that one involving only property damage and an accident resulting in minor injury is 11.8 times more severe than one with only property damage. To request a more detailed accident analysis for any intersection of concern

the County should contact the Division 9 Traffic Engineer.

Table D-4
High Accident Locations Outside the Urban Areas

Locations	Angle	Rear End	Ran off Road	Left Turn	Right Turn	Other	Total	Severity Index	SI by Road Type
US 70/ NC 801	3	6	0	2	0	0	11	5.04	9.25
NC 152/ SR 1002	7	5	1	10	0	2	25	8.18	9.38
SR 1006/ SR 1221	4	3	1	2	0	1	11	13.95	8.35
US 52/ NC 152	5	6	1	0	2	3	17	3.61	9.25
US 52/ SR 2417	5	1	0	4	0	1	11	16.80	9.25
US 52/ Salisbury St	0	8	0	1	0	1	10	3.96	9.25

Bridge Conditions

Bridges are a vital and unique element in the highway system. First, they have the highest unit investment of all the elements in the system. Second, any inadequacy or deficiency in a bridge reduces the value of the total investment. Third, a bridge presents the greatest opportunity of a potential highway failures for disruption of community welfare. Finally, a bridge represents the greatest opportunity of all highway failures for loss of life. It is imperative that bridges be constructed to the same design standards as the system of which they are a part.

All bridges in North Carolina are inspected at least once every two years by NCDOT's Bridge Maintenance Unit. A sufficiency rating is calculated for each bridge to determine whether or not it is adequate enough to remain in service. Factors include structural integrity, serviceability and functional obsolescence, essentiality for public use, type of structure, and traffic safety. The result is a percentage rating where 100 percent represents a sufficient bridge and zero represents an entirely deficient bridge. A sufficiency rating of 50 percent or less qualifies for Federal Bridge Replacement Funds. Deficient bridges are categorized as either structurally deficient or functionally obsolete. Structurally deficient bridges score below average in deck superstructure, substructure overall structural condition, or waterway adequacy. Functionally obsolete bridges have below average ratings in approach roadway alignment, under clearance, deck geometry, waterway adequacy, or structural condition. Table D-5 lists the deficient bridges in Rowan County outside the urban areas. Table D-6 lists the

functionally obsolete bridges.

Table D-5 Structurally Deficient Bridges			
Number	Facility	Location	Sufficiency Rating
8	NC 49 WBL	2.4 mi W NC 8	5.3
183	SR 2335	0.3 mi N SR 2336	18.6
30	SR 1973	0.1 mi E SR 1975	20.1
78	SR 1949	0.5 mi S NC 801	21.9
141	SR 1004	1.0 mi W SR 2140	28.5
7	SR 1753	0.45 mi N SR 1761	28.9
107	SR 1005	1.0 mi S SR 1004	32.9
177	SR 2359	0.5 mi W SR 2337	33.5
15	SR 1737	0.4 mi S SR 1771	35.8
26	SR 1003	0.5 mi E SR 1985	36.3
58	SR 1743	0.5 mi S SR 1749	36.4
12	SR 1547	0.3 mi N SR 1756	38.1
110	SR 2148	0.4 mi W SR 2356	40.8
80	NC 801	0.5 mi S SR 1984	41.6
19	SR 1735	0.7 mi E SR 1737	41.9
348	SR 1981	0.4 mi W SR 1984	42.4
25	SR 2048	0.2 mi N SR 1954	43.5
6	SR 1759	1 0 mi N SR 1753	44.5
160	SR 2341	0.3 mi N SR 2343	47.2
44	SR 1983	0.4 mi N SR 1984	47.8
184	SR 2333	0.4 mi N SR 2336	49.2
188	SR 2564	0.4 mi W SR 1006	50.0
85	US 70	2.7 mi E NC 801	52.1
69	NC 150	0.4 mi E SR 1737	72.5*
3	NC 49 EBL	2.4 mi W NC 8	72.9
40	SR 1982	0.1 mi S SR 1981	73.0*

Table D-6 Functionally Obsolete Bridges			
Number	Facility	Location	Sufficiency Rating
11	SR 1763	0.3 mi N SR 1766	35.2
50	SR 1986	0.9 mi S SR 1984	36.2
253	SR 1552	1.4 mi W SR 1555	47.3
28	NC 801	0.3 mi S SR 1739	49.3
20	US 52	1.7 mi S NC 152	53.4
185	SR 2320	0.3 mi N SR 2328	54.5
18	SR 1737	0.85 mi S SR 1526	55.5
156	SR 2370	75 ft N SR 2371	55.5
260	SR 1535	0.5 mi N SR 1541	55.7
61	NC 801	0.7 mi S SR 1984	55.8
163	SR 2343	0.1 mi E SR 2369	67.8

Alternative Plans

The fundamental function of transportation planning is the ability to test and analyze different thoroughfare configurations and their efficiency in serving an area as it grows. This process should evaluate existing conditions, past efforts to eliminate deficiencies in the network, and if possible propose more appropriate improvements given expected land use.

The process of developing and evaluating alternative plans involves a number of considerations. These can include considering local goals and objectives, existing and anticipated land uses, and travel service. The location and severity of traffic accidents, capacity deficiencies, and potential environmental impacts should also be considered.

No Build Alternative

Not implementing elements of a thoroughfare plan would be called a do-nothing alternative. This means that there would be no new construction or other improvements except routine maintenance. Some of the major advantages of doing nothing include:

1. No capital investment costs
2. No construction traffic disruption
3. No noise, air or water pollution due to construction
4. No removal of shrubs or trees
5. No additional land acquisition
6. No displacement of people or business as a result of construction.

There are, however, several disadvantages to a `do nothing' policy which would have significant adverse consequences for the area. These include:

1. Increasing traffic volumes and congestion on major streets, which will cause traffic to divert to residential streets
2. Existing `bottleneck' situations will become even worse
3. Social, health, and safety standards will deteriorate
4. Increased road user costs
5. Increased driving time
6. Increased accidents
7. Increased air and noise pollution induced by traffic congestion
8. Reduced mobility for emergency vehicles
9. Increased transport costs for businesses

10. Reduced retail sales due to increased congestion, reduced accessibility, and higher transport costs
11. Increased driver and public frustration due to congestion.

The `do nothing' concept, while an alternative, is not one actively encouraged by most planners because of its long list of negative impacts on an area. Figure D-2 shows how the existing road capacities at various locations throughout the county compare to existing 1995 ADTs and projected 2025 volumes.

Existing plus Committed Street System

This alternative consists of the existing major road network for Rowan County with the addition of those projects programmed in the FY2000-2006 State Transportation Improvement Program (TIP) that would affect traffic flows in the county. Those projects are listed in Appendix B.

Existing Thoroughfare Plan

This alternative consisted of a combination of the three mutually adopted thoroughfare plans in the county. The Rowan County portion of the 1996 mutually adopted Cabarrus-South Rowan Thoroughfare Plan as amended was included. The 1997 mutually adopted Salisbury Thoroughfare Plan including several completed projects was included. The 1970 mutually adopted Rowan County Thoroughfare Plan with the recommended alignment of the US 52 Bypass moved to reflect more recent developments was also included in the existing thoroughfare plan alternative network.

Recommended Alternative

This last alternative is a combination of the existing plus committed alternative, parts of the existing thoroughfare plan, the results of and environmental review, and suggestions extracted from discussions with local officials, staff, and the public (see Appendix F). The results of the analysis are discussed in Chapter Two.

Table D-7 External Station Trips by Trip Type							
Station	Name	1995 Trips			2025 Trips		
		Count	Through	E-I/I-E	Count	Through	E-I/I-E
101	I-85N	53460	45441	8019	98000	68689	29311
102	SR 1002E	330	20	310	460	23	437
103	NC 49E	6710	6576	134	9100	8918	182
104	NC 49W	6820	6547	273	9000	8820	180
105	SR 1005	704	14	690	800	8	792
106	US 52E	1000	10	990	5600	0	5600
107	SR 2352	726	7	719	620	0	620
108	SR 2338	374	4	370	330	0	330
109	SR 1006	880	53	827	1720	34	1686
110	SR 2400	5720	0	5720	7000	0	7000
111	SR 1002W	3300	132	3168	6900	69	6831
112	I-85S	56650	44754	11897	104170	61769	42401
113	US 29S	26400	264	26136	40000	400	39600
114	US 29-A	9020	90	8930	18500	0	18500
115	SR 1124/1680	19800	198	19602	31000	0	31000
116	SR 1369	3850	39	3812	10000	500	9500
117	SR 1353	572	6	566	1000	0	1000
118	NC 152W	6710	1141	5569	12500	1675	10825
119	NC 150W	3300	132	3168	7000	140	6860
120	NC 801W	2970	119	2851	6000	180	5820
121	SR 1001	1320	13	1307	2390	24	2366
122	US 70W	10120	1214	8906	15000	1800	13200
123	SR 1003	770	15	755	1400	0	1400
124	SR 1972	242	5	237	520	0	520
125	SR 1983	396	4	392	900	0	900
126	NC 801E	5500	275	5225	6100	244	5856
127	US 601N	4620	231	4389	8500	340	8160
Total		232264	107303	124961	404510	153633	250877
128	SR 1355	400	0	400	750	0	750
129	SR 1371	2000	0	2000	3050	0	3050
130	US 52Bypass	4600	2528	2072	16970	9925	7045
Total		239264	109831	129433	425280	163558	261722

Table D-8 Friction Factors				
Time	HBW	HBO	NHB	E-I
1	43000	39582	33214	77880
2	76000	77000	77000	60653
3	81058	81873	81873	47237
4	75578	74082	74082	36788
5	70469	67032	67032	28650
6	65705	60653	22983	22313
7	34058	23888	11788	17377
8	20528	13288	7130	6767
9	14167	8513	4721	3513
10	14167	8513	4721	3513
11	10531	5893	3309	2052
12	7884	4285	2413	1279
13	6015	3222	1811	830
14	4734	2484	1390	554
15	3121	1556	859	261
16	2592	1252	688	183
17	2176	1024	557	130
18	1844	841	454	93
19	1574	696	373	67
20	1353	580	308	48
21	1169	486	256	35
22	1015	409	214	26
23	886	345	180	19
24	776	293	151	14
25	681	249	128	10
26	600	213	108	8
27	531	182	92	6
28	470	156	79	4
29	417	134	67	4
30	371	116	57	3
31	331	100	49	3
32	296	86	42	3
33	264	75	37	2
34	237	65	32	2
35	212	56	27	2
36	191	49	24	1
37	172	43	20	1
38	155	37	18	1
39	139	33	15	1
40	126	28	13	1

Table D-9 Base Year 1995 Dwelling Units and Commercial Vehicles								
zones	E	AA	A	BA	P		TRK	CA
1.0	63.0	83.0	344.0	96.0	18.0		2.0	3.0
2.0	2.0	33.0	168.0	160.0	136.0		1.0	3.0
3.0	3.0	41.0	262.0	195.0	125.0		3.0	7.0
4.0	1.0	24.0	163.0	113.0	125.0		17.0	84.0
5.0	0.0	17.0	634.0	155.0	32.0		3.0	2.0
6.0	4.0	20.0	180.0	166.0	151.0		11.0	19.0
7.0	0.0	14.0	364.0	294.0	18.0		1.0	2.0
8.0	19.0	79.0	535.0	162.0	44.0		1.0	2.0
9.0	10.0	53.0	273.0	84.0	11.0		18.0	56.0
10.0	13.0	99.0	352.0	154.0	19.0		20.0	14.0
11.0	0.0	198.0	165.0	21.0	4.0		59.0	33.0
12.0	59.0	145.0	364.0	169.0	36.0		1.0	2.0
13.0	88.0	151.0	361.0	57.0	9.0		12.0	45.0
14.0	4.0	44.0	223.0	99.0	5.0		17.0	23.0
15.0	38.0	220.0	415.0	92.0	18.0		1.0	3.0
16.0	10.0	50.0	253.0	201.0	176.0		2.0	3.0
17.0	11.0	75.0	450.0	150.0	110.0		23.0	106.0
18.0	14.0	35.0	130.0	115.0	110.0		3.0	2.0
19.0	1.0	30.0	210.0	100.0	125.0		2.0	8.0
20.0	8.0	39.0	241.0	103.0	27.0		1.0	3.0
21.0	9.0	25.0	320.0	100.0	30.0		0.0	0.0
22.0	10.0	20.0	140.0	162.0	10.0		2.0	10.0
23.0	2.0	7.0	350.0	99.0	16.0		10.0	12.0
24.0	9.0	126.0	476.0	154.0	30.0		1.0	3.0
25.0	30.0	92.0	220.0	145.0	40.0		3.0	2.0
26.0	10.0	75.0	325.0	137.0	135.0		1.0	4.0
27.0	9.0	70.0	424.0	147.0	29.0		1.0	1.0
28.0	6.0	89.0	509.0	204.0	32.0		0.0	1.0
29.0	5.0	25.0	270.0	119.0	31.0		1.0	2.0
30.0	1.0	19.0	487.0	160.0	20.0		5.0	8.0
31.0	19.0	105.0	608.0	78.0	27.0		8.0	14.0
32.0	0.0	21.0	425.0	224.0	19.0		8.0	38.0
33.0	17.0	187.0	365.0	123.0	30.0		8.0	25.0
34.0	12.0	22.0	288.0	89.0	12.0		59.0	25.0
35.0	0.0	11.0	300.0	188.0	26.0		9.0	25.0
36.0	10.0	100.0	244.0	69.0	9.0		8.0	21.0
37.0	10.0	49.0	299.0	84.0	32.0		9.0	29.0
38.0	4.0	65.0	266.0	113.0	20.0		1.0	2.0
39.0	3.0	47.0	270.0	62.0	14.0		1.0	5.0
40.0	7.0	55.0	238.0	98.0	13.0		1.0	2.0
41.0	60.0	84.0	299.0	210.0	30.0		1.0	3.0
42.0	56.0	83.0	254.0	102.0	57.0		1.0	3.0
43.0	67.0	86.0	462.0	183.0	35.0		2.0	6.0
44.0	44.0	56.0	154.0	75.0	18.0		9.0	22.0
45.0	4.0	31.0	306.0	185.0	22.0		2.0	5.0
46.0	4.0	55.0	200.0	124.0	127.0		2.0	8.0

Table D-9 cont. Base Year 1995 Dwelling Units and Commercial Vehicles								
47.0	31.0	52.0	188.0	48.0	2.0		11.0	6.0
48.0	54.0	89.0	275.0	53.0	19.0		4.0	4.0
49.0	16.0	26.0	191.0	42.0	15.0		0.0	0.0
50.0	1.0	20.0	195.0	315.0	25.0		1.0	2.0
51.0	90.0	132.0	145.0	110.0	60.0		0.0	0.0
52.0	15.0	25.0	130.0	75.0	25.0		2.0	8.0
53.0	2.0	70.0	459.0	260.0	49.0		2.0	10.0
54.0	5.0	20.0	300.0	165.0	40.0		11.0	34.0
55.0	7.0	15.0	345.0	130.0	51.0		2.0	6.0
56.0	1.0	20.0	547.0	74.0	21.0		9.0	26.0
57.0	6.0	42.0	271.0	121.0	11.0		2.0	3.0
58.0	17.0	60.0	510.0	245.0	50.0		3.0	4.0
59.0	6.0	15.0	195.0	105.0	15.0		9.0	13.0
60.0	9.0	34.0	319.0	49.0	6.0		1.0	3.0
61.0	15.0	124.0	283.0	10.0	0.0		0.0	0.0
62.0	36.0	273.0	112.0	29.0	7.0		0.0	0.0
63.0	40.0	35.0	140.0	112.0	20.0		0.0	0.0
64.0	10.0	60.0	320.0	430.0	53.0		18.0	13.0
65.0	3.0	30.0	285.0	60.0	15.0		22.0	35.0
66.0	10.0	35.0	210.0	136.0	45.0		12.0	26.0
67.0	5.0	15.0	95.0	10.0	26.0		8.0	5.0
68.0	20.0	60.0	290.0	200.0	150.0		7.0	10.0
69.0	70.0	179.0	800.0	310.0	220.0		8.0	19.0
70.0	70.0	260.0	190.0	25.0	14.0		14.0	41.0
71.0	12.0	30.0	160.0	200.0	60.0		18.0	62.0
72.0	12.0	8.0	338.0	158.0	22.0		2.0	1.0
73.0	4.0	22.0	198.0	152.0	21.0		1.0	1.0
74.0	50.0	109.0	207.0	2.0	1.0		22.0	21.0
75.0	0.0	2.0	136.0	162.0	9.0		1.0	3.0
76.0	20.0	67.0	201.0	168.0	8.0		11.0	18.0
77.0	3.0	35.0	120.0	125.0	5.0		6.0	10.0
78.0	15.0	35.0	65.0	25.0	20.0		1.0	3.0
79.0	5.0	25.0	135.0	70.0	50.0		72.0	195.0
80.0	20.0	68.0	275.0	140.0	105.0		10.0	36.0
81.0	6.0	45.0	260.0	225.0	182.0		33.0	84.0
82.0	1.0	36.0	236.0	120.0	50.0		2.0	10.0
83.0	0.0	12.0	294.0	96.0	24.0		27.0	18.0
84.0	14.0	36.0	286.0	102.0	29.0		13.0	43.0
85.0	7.0	40.0	517.0	201.0	63.0		3.0	8.0
86.0	6.0	30.0	191.0	118.0	6.0		0.0	0.0
87.0	5.0	30.0	250.0	275.0	30.0		0.0	0.0
88.0	1.0	39.0	246.0	101.0	8.0		17.0	15.0
89.0	10.0	33.0	343.0	182.0	61.0		2.0	7.0
90.0	0.0	22.0	206.0	70.0	5.0		1.0	2.0
91.0	1.0	5.0	270.0	477.0	12.0		0.0	1.0

Table D-10 Base Year 1995 Employment					
Zones	I	RET	HR	O/I	S
1.0	51.0	8.0	22.0	0.0	3.0
2.0	47.0	23.0	1.0	0.0	0.0
3.0	91.0	11.0	9.0	78.0	0.0
4.0	1678.0	19.0	1.0	1.0	6.0
5.0	7.0	9.0	29.0	0.0	51.0
6.0	332.0	139.0	53.0	0.0	2.0
7.0	35.0	10.0	6.0	0.0	0.0
8.0	44.0	2.0	2.0	0.0	2.0
9.0	80.0	1.0	0.0	0.0	1743.0
10.0	61.0	440.0	90.0	18.0	51.0
11.0	4.0	1482.0	225.0	31.0	55.0
12.0	41.0	13.0	0.0	0.0	4.0
13.0	838.0	110.0	0.0	2.0	24.0
14.0	291.0	239.0	92.0	20.0	88.0
15.0	37.0	0.0	0.0	6.0	32.0
16.0	133.0	10.0	0.0	2.0	39.0
17.0	1927.0	21.0	4.0	81.0	173.0
18.0	18.0	45.0	25.0	0.0	4.0
19.0	145.0	4.0	0.0	0.0	16.0
20.0	42.0	2.0	0.0	0.0	32.0
21.0	0.0	0.0	0.0	0.0	0.0
22.0	178.0	0.0	5.0	0.0	3.0
23.0	79.0	179.0	38.0	4.0	143.0
24.0	55.0	3.0	0.0	0.0	2.0
25.0	0.0	9.0	0.0	0.0	0.0
26.0	68.0	16.0	0.0	1.0	6.0
27.0	13.0	32.0	2.0	0.0	0.0
28.0	9.0	1.0	0.0	0.0	5.0
29.0	12.0	4.0	0.0	0.0	45.0
30.0	27.0	134.0	0.0	1.0	115.0
31.0	137.0	191.0	0.0	0.0	59.0
32.0	30.0	1.0	3.0	681.0	75.0
33.0	347.0	82.0	0.0	0.0	197.0
34.0	793.0	295.0	570.0	18.0	792.0
35.0	448.0	60.0	38.0	3.0	30.0
36.0	298.0	68.0	29.0	67.0	32.0
37.0	526.0	58.0	23.0	12.0	15.0
38.0	9.0	16.0	0.0	10.0	8.0
39.0	56.0	11.0	7.0	3.0	0.0
40.0	9.0	6.0	0.0	3.0	45.0
41.0	42.0	1.0	9.0	0.0	17.0
42.0	63.0	5.0	8.0	0.0	5.0
43.0	107.0	7.0	13.0	0.0	3.0
44.0	274.0	50.0	51.0	16.0	201.0
45.0	14.0	1.0	0.0	2.0	155.0
46.0	148.0	20.0	0.0	0.0	10.0

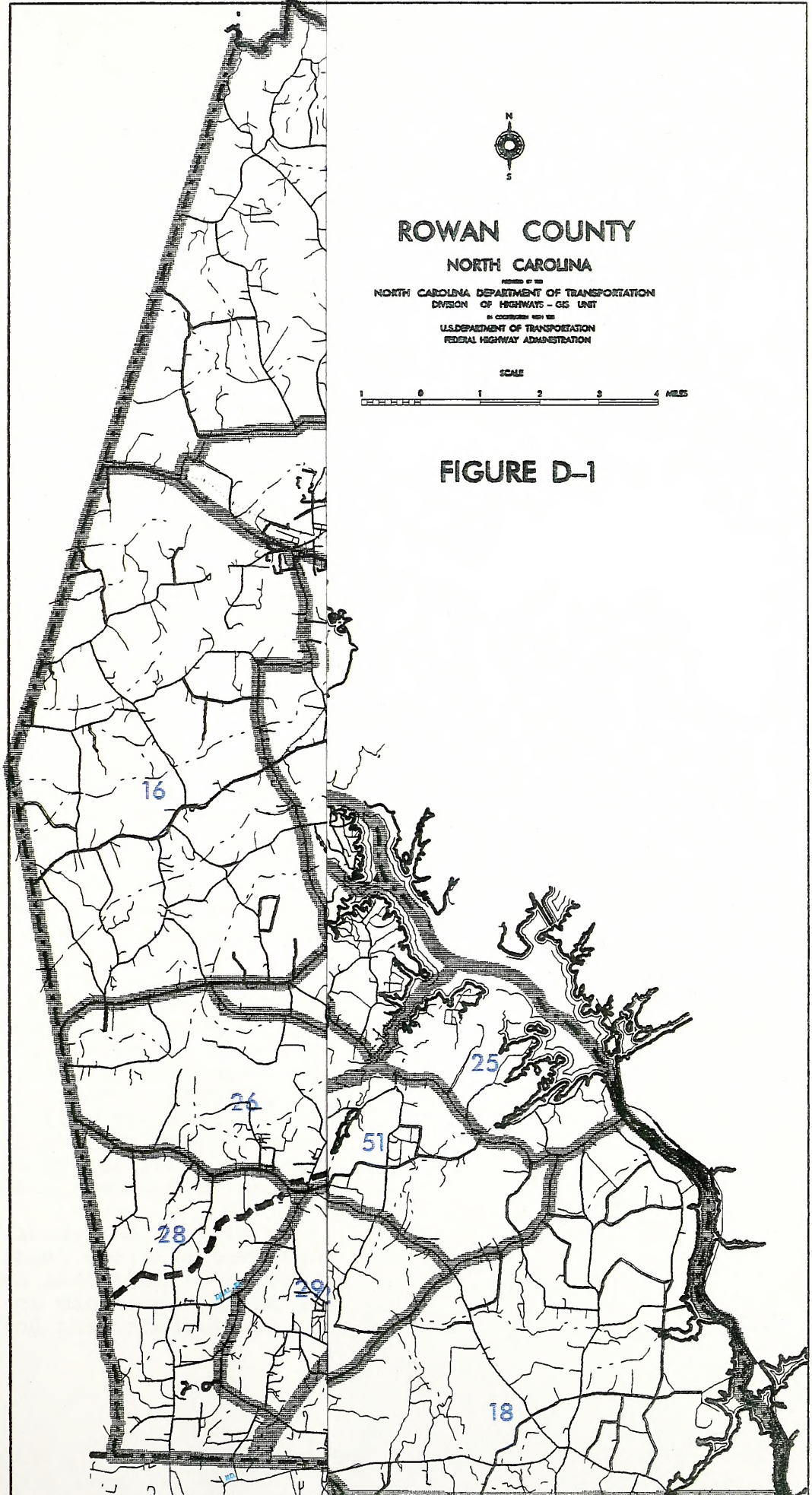
Table D-10 cont. Base Year 1995 Employment					
47.0	25.0	79.0	126.0	9.0	96.0
48.0	10.0	120.0	0.0	16.0	10.0
49.0	1.0	8.0	0.0	0.0	7.0
50.0	13.0	15.0	0.0	23.0	0.0
51.0	4.0	2.0	0.0	0.0	0.0
52.0	139.0	0.0	0.0	0.0	49.0
53.0	190.0	4.0	0.0	0.0	0.0
54.0	586.0	65.0	32.0	15.0	86.0
55.0	110.0	8.0	0.0	0.0	21.0
56.0	435.0	129.0	4.0	24.0	0.0
57.0	38.0	50.0	0.0	1.0	5.0
58.0	0.0	11.0	22.0	0.0	117.0
59.0	162.0	138.0	41.0	6.0	46.0
60.0	10.0	2.0	0.0	20.0	45.0
61.0	0.0	1.0	0.0	0.0	0.0
62.0	0.0	9.0	0.0	0.0	2.0
63.0	0.0	0.0	0.0	0.0	0.0
64.0	92.0	152.0	172.0	5.0	169.0
65.0	127.0	39.0	172.0	45.0	855.0
66.0	365.0	51.0	83.0	0.0	213.0
67.0	0.0	205.0	20.0	14.0	10.0
68.0	21.0	39.0	53.0	79.0	145.0
69.0	207.0	102.0	23.0	30.0	164.0
70.0	1.0	5.0	0.0	0.0	1348.0
71.0	1165.0	138.0	24.0	0.0	39.0
72.0	20.0	0.0	34.0	0.0	4.0
73.0	0.0	15.0	3.0	3.0	21.0
74.0	6.0	190.0	184.0	16.0	549.0
75.0	0.0	0.0	0.0	112.0	0.0
76.0	73.0	122.0	45.0	45.0	332.0
77.0	138.0	46.0	39.0	0.0	72.0
78.0	23.0	0.0	0.0	22.0	29.0
79.0	877.0	640.0	143.0	1572.0	1978.0
80.0	590.0	67.0	10.0	15.0	153.0
81.0	1553.0	12.0	249.0	25.0	161.0
82.0	156.0	0.0	0.0	2.0	86.0
83.0	268.0	152.0	328.0	6.0	51.0
84.0	656.0	36.0	50.0	58.0	207.0
85.0	140.0	59.0	3.0	3.0	0.0
86.0	2.0	8.0	0.0	0.0	2.0
87.0	6.0	0.0	1.0	0.0	6.0
88.0	150.0	110.0	178.0	30.0	112.0
89.0	76.0	12.0	0.0	5.0	92.0
90.0	2.0	16.0	0.0	0.0	56.0
91.0	2.0	9.0	0.0	4.0	6.0

Table D-11 Future year 2025 Dwelling Units and Commercial Vehicles								
Zones	E	AA	A	BA	P		TRK	CA
1	90	119	492	137	26		3	6
2	3	55	444	266	60		3	5
3	5	68	599	324	41		7	14
4	2	50	552	237	64		131	131
5	0	38	1410	345	71		4	7
6	7	48	507	242	60		13	27
7	43	29	830	506	38		2	4
8	34	139	941	285	77		2	4
9	48	99	556	80	21		54	109
10	24	185	656	287	35		20	42
11	36	369	296	14	7		54	110
12	121	242	461	264	121		2	4
13	164	282	673	106	17		46	94
14	59	87	437	148	10		33	67
15	124	435	877	77	36		3	6
16	17	119	668	300	40		7	14
17	12	126	837	262	83		73	149
18	16	32	216	108	27		3	7
19	35	56	600	130	48		6	13
20	17	82	505	216	57		3	6
21	20	56	711	222	67		0	0
22	26	37	365	191	19		7	14
23	3	12	621	146	27		17	34
24	13	180	681	220	43		2	5
25	0	60	335	301	57		0	1
26	51	140	831	191	60		3	7
27	19	147	889	308	61		2	4
28	63	166	981	298	60		1	1
29	34	47	533	168	58		2	5
30	43	40	1027	288	42		10	21
32	43	44	847	470	40		24	50
33	44	283	534	186	45		24	48
34	13	24	315	97	13		105	214
35	0	23	629	394	54		30	61
36	17	171	417	118	15		19	38
37	25	64	377	109	42		24	49
38	7	111	454	193	34		2	3
39	7	99	565	130	29		3	6
40	12	94	407	167	22		2	5
41	17	69	836	446	63		16	33
42	11	60	642	185	103		3	6
43	49	65	1019	332	45		16	33
44	25	65	370	136	33		28	57
45	8	65	642	388	46		6	13
46	7	103	544	221	49		10	21
47	34	57	206	53	2		6	12
48	59	97	301	58	21		36	74
49	25	41	277	66	45		1	1
50	25	23	238	313	28		2	4
51	24	76	314	135	56		0	0
52	14	19	196	100	32		7	14
53	4	147	962	545	103		7	15
54	10	42	629	346	84		30	60

Table D-11 cont. Future year 2025 Dwelling Units and Commercial Vehicles								
55	13	27	625	236	92		5	11
57	11	78	505	226	21		4	7
58	30	109	925	444	91		6	12
59	11	28	364	196	28		15	30
60	39	93	595	39	11		9	18
61	64	231	491	19	0		6	12
62	63	480	197	51	12		0	1
63	72	64	254	203	36		0	0
64	18	109	580	780	96		16	33
64	18	109	580	780	96		16	33
65	4	40	384	81	20		7	14
65	4	40	384	81	20		7	14
66	28	55	241	173	57		25	50
67	5	16	104	11	28		7	13
68	46	91	371	292	114		20	40
68	46	91	371	292	114		20	40
69	77	316	16	170	66		17	35
70	239	294	204	16	1		48	98
71	13	33	181	230	49		32	66
72	21	14	595	278	39		2	4
73	5	25	230	177	24		9	17
74	68	147	279	2	1		36	72
75	0	2	158	188	10		4	9
76	23	78	233	195	9		33	68
77	3	41	139	145	6		10	20
78	26	54	75	34	27		4	9
79	9	37	244	55	22		183	372
80	27	92	506	189	74		38	78
81	7	49	284	356	90		96	196
82	2	56	368	197	69		22	45
83	0	13	322	105	26		27	55
84	29	75	666	147	61		20	40
85	14	84	1084	422	132		21	42
86	22	63	454	184	13		0	1
87	37	63	703	371	63		0	1
88	2	82	515	212	17		22	44
89	22	73	763	405	136		7	14
90	0	40	373	127	9		3	6
91	2	11	600	1061	27		1	2

Table D-12 Future Year 2025 Employment					
Zone	I	RET	HR	O/I	S
1	112	18	48	0	7
2	103	50	2	0	0
3	200	24	20	171	0
4	3692	41	4	4	15
5	15	20	64	0	112
6	374	157	60	0	2
7	56	22	13	0	21
8	97	4	4	0	4
9	137	2	0	0	2990
10	110	794	162	32	92
11	7	2604	395	54	97
12	90	29	0	0	9
13	2314	304	0	6	66
14	770	633	244	53	233
15	81	0	0	13	70
16	294	22	0	4	86
17	11318	123	23	476	1016
18	40	99	55	0	9
19	319	9	0	0	35
20	92	4	0	0	70
21	0	0	0	0	0
22	392	0	11	0	7
23	174	394	84	9	315
24	121	7	0	0	4
26	150	35	0	2	13
27	29	70	4	0	0
28	20	2	0	0	11
29	26	9	0	0	99
30	59	295	0	2	253
31	545	759	0	0	235
32	85	62	5	1224	43
33	763	180	0	0	433
34	1974	369	1419	45	2337
35	879	182	115	9	572
36	656	150	64	147	70
37	1157	128	51	26	33
38	20	35	0	22	18
39	85	24	15	7	39
40	20	13	0	7	99
41	572	14	122	0	231
42	139	11	18	0	11
43	782	51	95	0	22
44	763	139	142	45	560
45	31	2	0	4	341
46	495	67	0	0	33
47	26	83	132	9	101
48	135	1625	0	217	135
49	2	18	0	0	15
50	29	33	0	51	0
51	9	4	0	0	0
52	306	0	0	0	108
53	418	9	0	0	0
54	1289	143	70	33	189

Table D-12 cont. Future Year 2025 Employment					
55	242	18	0	0	46
56	957	284	9	53	0
57	84	110	0	2	11
58	0	24	48	0	257
59	356	304	90	13	101
60	66	153	0	133	159
61	0	357	0	0	0
62	0	20	0	0	4
63	0	0	0	0	0
64	148	245	277	8	272
65	40	12	55	14	271
66	578	390	168	0	308
67	0	316	31	22	15
68	71	132	180	268	492
69	400	197	44	58	317
70	2	10	0	0	2801
71	1615	191	33	0	54
72	44	0	75	0	9
73	0	178	36	36	249
74	13	418	405	35	1208
75	0	0	0	246	0
76	231	386	142	142	1049
77	230	144	76	0	125
78	80	0	0	77	101
79	1066	1309	292	3215	4774
80	1336	401	27	40	423
81	4356	34	698	70	452
82	830	0	0	11	458
83	521	296	638	12	99
84	569	41	57	66	407
85	607	350	18	18	222
86	4	18	0	0	4
87	11	0	2	0	15
88	330	242	392	66	246
89	167	102	0	11	127
90	4	35	0	0	123
91	4	20	0	9	13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S
ROWAN COUNTY
NORTH CAROLINA
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS - GIS UNIT
U.S.DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
SCALE
1 0 1 2 3 4 MILES
16
25
26
51
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18

FIGURE D-1

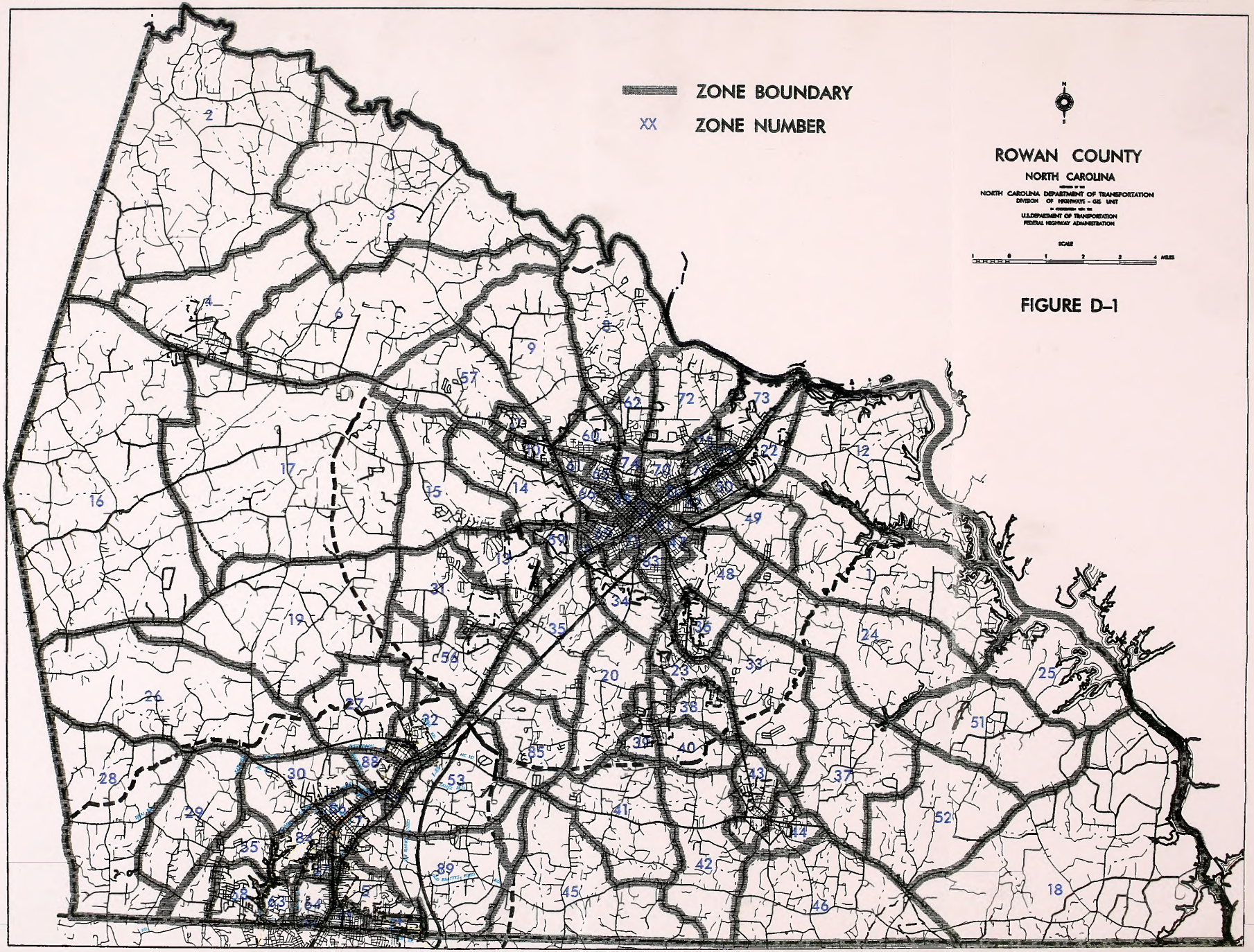

ZONE BOUNDARY
XX ZONE NUMBER
ROWAN COUNTY
NORTH CAROLINA
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS - GIS UNIT
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
SCALE
MILES

FIGURE D-1

APPENDIX E

ENVIRONMENTAL CONCERNS

In the past few years environmental considerations associated with highway construction have come to the forefront of the planning process. The legislation that dictates the necessary procedures regarding environmental impacts is the National Environmental Policy Act (NEPA). Section 102 of NEPA requires the execution of an environmental impact statement, or EIS, for road projects that have a significant impact on the environment. Included in an EIS would be the project's impact on wetlands, water quality, historic properties, wildlife, and public lands. While this report does not cover the environmental concerns in as much detail as an EIS would, preliminary research was done on several of these factors and is included below. Figure E-1 shows selected environmental data for Rowan County.

Wetlands

In general terms, wetlands are lands where saturation with water is the dominant factor in determining the nature of the soil development and the types of plant and animal communities living in the soil and on its surface. The single feature that most wetlands share is soil or sub strata that is at least periodically saturated with or covered by water. Water creates severe physiological problems for all plants and animals except those that are adapted for life in it or in saturated soil.

Wetlands are crucial ecosystems in our environment. They help regulate and maintain the hydrology of our rivers, lakes, and streams by slowly storing and releasing flood waters. They help maintain the quality of our water by storing nutrients, reducing sediment loads, and reducing erosion. They are also critical to fish and wildlife populations. Wetlands provide an important habitat for about one third of the plant and animal species that are federally listed as threatened or endangered.

In this study the impacts to wetlands were determined using the National Wetlands Inventory Mapping, available from the U.S. Fish and Wildlife Service. Wetlands impacts have been avoided or minimized to the greatest extent possible while preserving the integrity of the thoroughfare plan.

Threatened and Endangered Species

A preliminary review of the Federally Listed Threatened and Endangered Species within Rowan County was done to determine the effects that any proposed improvements could have on those species. These species were identified using mapping from the North Carolina Department of Environment, Health, and Natural Resources.

The Threatened and Endangered Species Act of 1973 allows the U. S. Fish and Wildlife Service to impose measures on the Department of Transportation to mitigate the environmental impacts of a road project on endangered plants and animals and critical wildlife habitats. By locating rare species in the planning stage of road construction, we are able to avoid or minimize these impacts.

Historic Sites

The location of historic sites in Rowan County were investigated to determine the possible impacts of the various projects studied. The federal government has issued guidelines requiring all State Transportation Departments to make special efforts to preserve historic sites. These two pieces of legislation are:

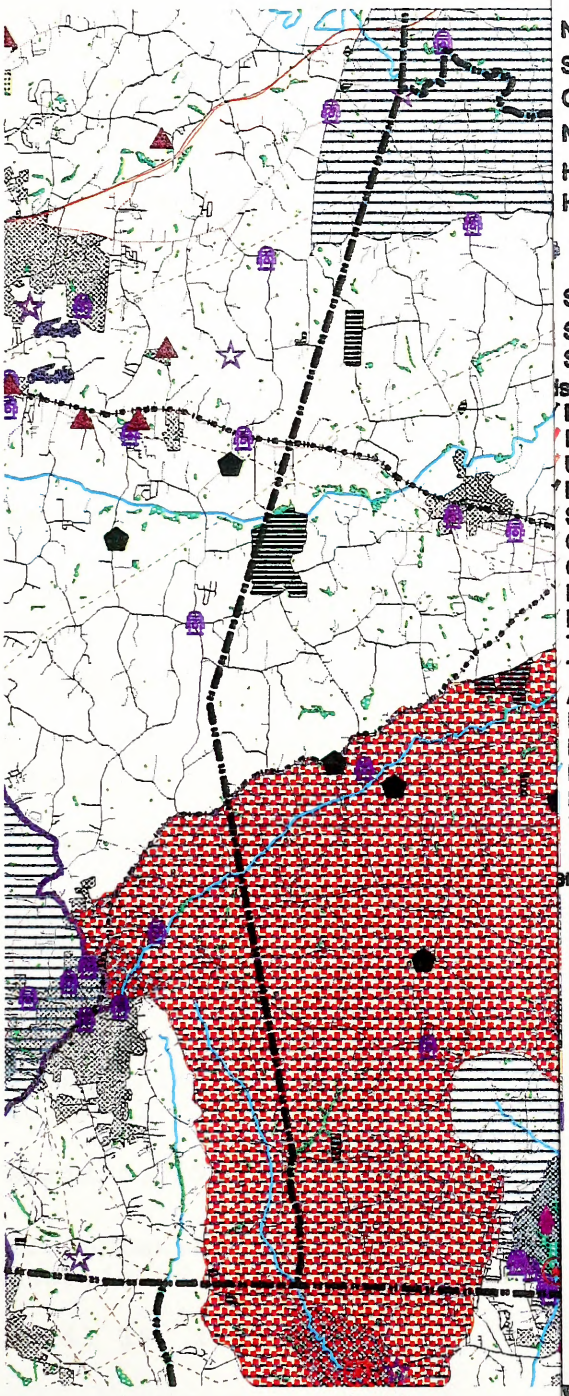
National Historic Preservation Act - Section 106 of this act requires the Department of Transportation to identify historic properties listed in the National Register of Historic Places and properties eligible to be listed. The DOT must consider the impact of its road projects on these properties and consult with the Federal Advisory Council on Historic Preservation.

NC General Statute 121-12(a) - This statute requires the DOT to identify historic properties listed on the National Register, but not necessarily those eligible to be listed. DOT must consider impacts and consult with the North Carolina Historical Commission, but is not bound by their recommendations.

A preliminary investigation found that there were several historic properties in Rowan County. Table E-1 has a list of the properties outside the urban areas.

Table E-1 Historic Properties	
Henry Connor Bost House	Mount Vernon
George Matthias Bernhardt House	St. Andrews Episcopal Ch/Cem
Hall Family House	Michael Braun House
Wood Grove	Corriher Grange Hall
Knox Farm Historic District	Lyerly Bldg for Boys
Third Creek Presbyterian Ch/Cem	Shupings Mill Complex BURNED
Thyatira Presbyterian Ch/Cem/Manse	Rankin-Sherrill House
John Stigerwalt House	Back Creek Presbyterian Ch/Cem
Owen-Harrison House	Zion Lutheran Church
John Phifer Farm	Grace Evangelical/Reformed Ch
Knox-Johnstone House	Kerr Mill

EnviCounty



NPDES - Non Discharge Systems (100k)
Surface Water Intakes (100k)
Groundwater Incidents (100k)
Nat. Heritage Occurence Sites (Restricted-100k)
Hist. Struct.-NR (Restricted-100k)
Hist. Dist. -NR (Restricted-100k)
Solid Waste Facilities (24k)
Superfund Pts. (Haz. Subs. Dispos. Sites)
Superfund Areas (Haz. Subs. Dispos. Sites)
Sub.Root Vasculars (point-24k)
s (DOT 24k - no attributes)
Railroad
Interstate
US
NC
SR
City
Other
Pipe,Transmission & Airports (100k)
Prop. Critical Habitat Areas (1 mile buffer-24k)
Trout Streams (WRC - 100k)
Trout Streams (DWQ - 100k)
Anadromous Fish Spawning Areas (100k)
Fish Nursery Areas (24k)
NWI (poly-24k)
Hydro - Major Rivers/Streams (100k)
Hydro - Major Water Bodies (100k)
HQW Zones (100k)
Groundwater Recharge/Discharge Areas (100k)
r Supply Watersheds (24k)
Critical
Protected
Natural Areas (Restricted-24k)
Gamelands (100k)
Municipal Boundaries (24k)
State Parks (100k)
State Owned Complexes (100k)
Federally Owned Lands (100k)
River Basins - Major (24k)

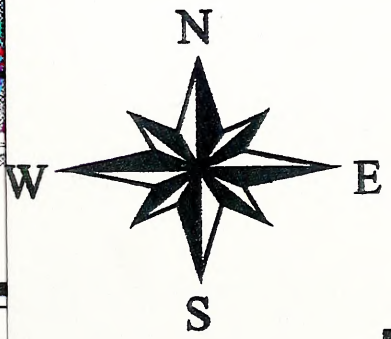


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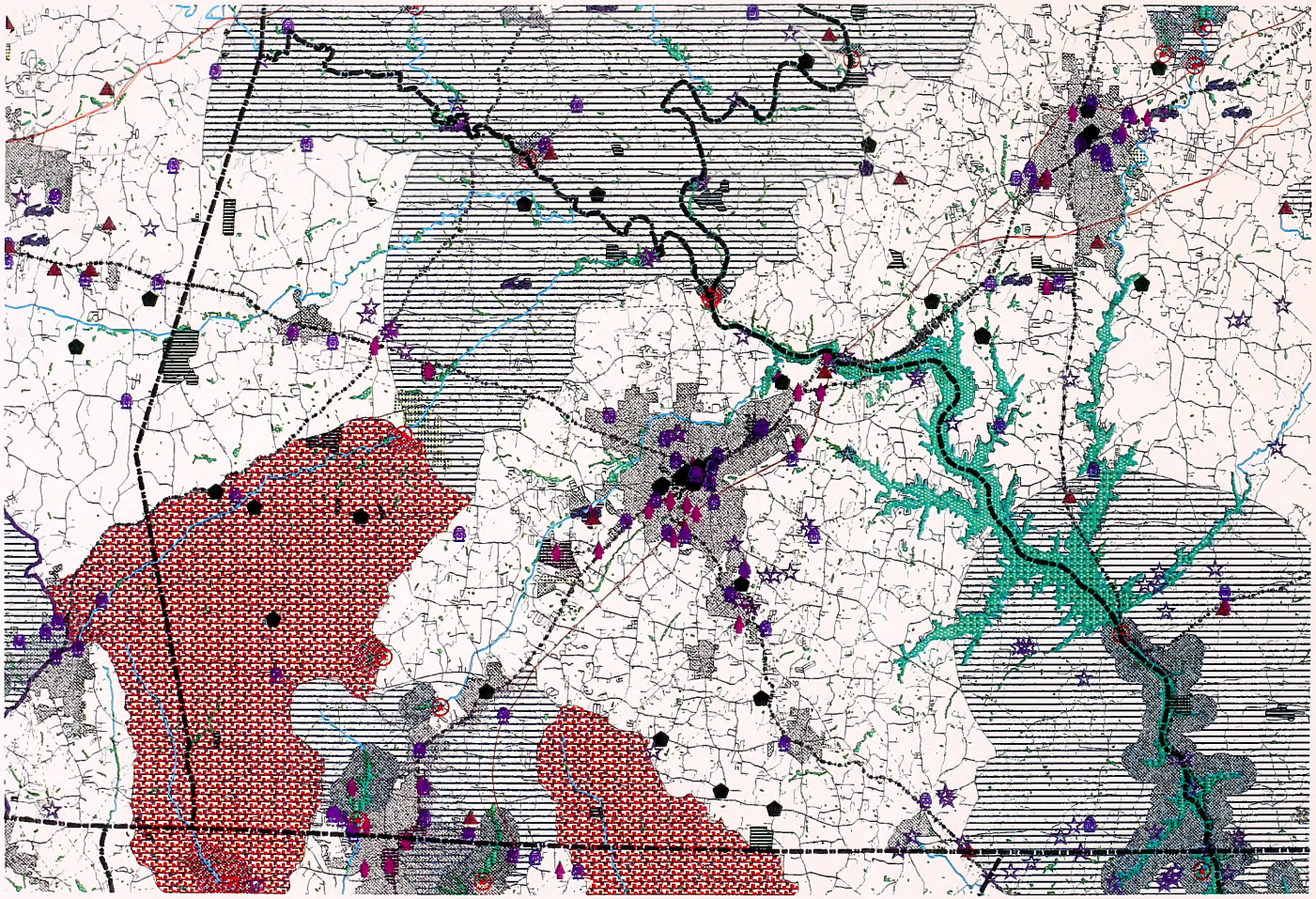
Figure E-1

Environmental Data for Rowan County



NPDES - Non Discharge Systems (100k)
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City
Other
Pipe,Transmission & Airports (100k)
Prop. Critical Habitat Areas (1 mile buffer-24k)
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Fish Nursery Areas (24k)
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Hydro - Major Water Bodies (100k)
HQW Zones (100k)
Groundwater Recharge/Discharge Areas (100k)
Water Supply Watersheds (24k)
Critical
Protected
Natural Areas (Restricted-24k)
Gamelands (100k)
Municipal Boundaries (24k)
State Parks (100k)
State Owned Complexes (100k)
Federally Owned Lands (100k)
River Basins - Major (24k)

10 0 10 20 Miles

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W E
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Figure E-1

APPENDIX F

PUBLIC PARTICIPATION

April 19, 1995

Initial meeting with the Rowan County Planning Staff to discuss the study process and data inventory needs.

March 25, 1996

Presentation of the thoroughfare planning process to the Rowan County Planning Board. Included was a description of which steps had already been completed in the preceding year.

September 28, 1998

Presentation of recommended plan and improvements to Rowan County Planning Board.

November 2, 1998

Held public hearing on the recommended plan in the Town of Cleveland.

November 9, 1998

Held public hearing on the recommended plan in the Town of Rockwell.

November 9, 1998

Presentation of recommended plan and improvements to Rockwell Town Council.

April 5, 1999

Presentation of final recommended thoroughfare plan and associated Salisbury Urban Area revision.

April 19, 1999

Adoption of Rowan County thoroughfare plan by County Commissioners.

May 10, 1999

Adoption of Rowan County thoroughfare plan by the Town of Cleveland.

May 10, 1999

Adoption of Rowan County thoroughfare plan by the Town of Rockwell.

September 24, 1999

Adoption of Rowan County thoroughfare plan by the North Carolina Department of Transportation Board of Transportation.

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

JAMES B. HUNT JR.
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

E. NORRIS TOLSON
SECRETARY

November 10, 1998

MEMORANDUM TO: Mr. Marion Lytle
Rowan County Planner

FROM: Linda Dosse, P.E.
Project Engineer

SUBJECT: Rowan County Long-range Thoroughfare Plan

Public Meeting - Cleveland November 2, 1998

4:00pm to 7:00pm

The meeting was attended by about 25 citizens. These are some of the pertinent comments dealing with the thoroughfare plan:

- Improvements to Miller Rd and Barringer Rd across the railroad tracks which are inside the Salisbury Planning Area
- Put the rest of Third Creek Church Road onto plan because of present and potential residential development
- At the Sherrills Ford Rd and NC 801 intersection it is hard to see on the hill
- US 70 and Old US 70 intersection. The right turn bay is much too short for the amount of present traffic.
- Woodleaf six-leg intersection has high truck traffic from the quarry
- Amity Hill Rd (SR 1001) also has high volume of truck traffic between Freightliner and Moorsville and I-77. There are also a lot of curves.
- Trucks from Freightliner also use Cool Springs Rd to go north to I-40. Perhaps a bypass on the west side of Cleveland, close in
- Bear Poplar Rd also has a high volume due to Freightliner trucks
- The bridge over Third Creek on Third Creek Church Rd has no rail or shoulder and a dangerous drop.

Public Meeting - Rockwell November 9, 1998

3:00pm to 6:30pm

- The vast majority of the comments were about R-2903, the US 52 Bypass. One person said that if they do not use the eastern alignment there probably will never be a high type of facility on that side of the county
- Perhaps widening existing US 52 to three lanes by removing on street parking between Rockwell and the High School at St. Lukes Rd

Rockwell Town Board Meeting November 9, 1998

7:00pm

- The Town and the County have already endorsed an alignment for US 52 Bypass
- The Mayor suggested a possible loop or bypass around the Town

Response to Public Comments

Cleveland - November 2, 1998

Those sections of Miller Rd and Barringer Rd are inside the Salisbury Planning Area and outside the scope of this study. All of Third Creek Church Rd was put onto the Plan. Realignment and flattening of the hill at the NC 801 and Sherrills Ford Rd intersection are included in the recommendation. The US 70 and Old US 70 intersection recommendations have been included in the plan. The realignment of the Woodleaf and NC 801 intersection was included in the recommendations for the Plan. It has been recommended that Amity Hill Rd be widened and straightened. The topography in the Third Creek Church Rd area is difficult and the residential development has become much too dense to build a quality facility close in to Cleveland up tp the Cool Springs Rd area. Bear Poplar Rd was not put on the Plan because it parallels Hall Rd and Ketchie Rd which are part of a group of cross-county feeder roads. Again, the topography along Third Creek Church Rd is difficult and dangerous. Improvements to the bridge over Third Creeklare included in the recommendations.

Rockwell - November 9, 1998

Comments about R-2903, the US 52 Bypass were transmitted to the project engineer. Existing US 52 will have enough capacity to carry the projected traffic after the US 52 Bypass is in place. Parking spaces are crucial to the continued prosperity of the numerous businesses lining existing US 52. The alignment for the US 52 Bypass on the Salisbury Transportation Plan was amended to correspond with the alignment chosen by the County and the Town of Rockwell. A loop road around the Town of Rockwell would be difficult and costly, especially a new railroad crossing south of Town.

APPENDIX G

RECOMMENDED SUBDIVISION ORDINANCES

Definitions

I. Streets and Roads:

A. Rural Roads

1. Principal Arterial - A rural link in a highway system serving travel, and having characteristics indicative of substantial statewide or interstate travel and existing solely to serve traffic. This network would consist of Interstate routes and other routes designated as principal arterials.

2. Minor Arterial - A rural roadway joining cities and larger towns and providing intra-state and inter-county service at relatively high overall travel speeds with minimum interference to through movement.

3. Major Collector - A road which serves major intra-county travel corridors and traffic generators and provides access to the Arterial system.

4. Minor Collector - A road which provides service to small local communities and traffic generators and provides access to the Major Collector system.

5. Local Road - A road which serves primarily to provide access to adjacent land, over relatively short distances.

B. Urban Streets

1. Major Thoroughfares - Major thoroughfares consist of Interstate, other freeway, expressway, or parkway roads, and major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas.

2. Minor Thoroughfares - Minor thoroughfares perform the function of collecting traffic from local access streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through-traffic movements

and may also serve abutting property.

3. Local Street - A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

C. Specific Type Rural or Urban Streets

1. Freeway, expressway, or parkway - Divided multilane roadways designed to carry large volumes of traffic at high speeds. A freeway provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. An expressway is a facility with full or partial control of access and generally with grade separations at major intersections. A parkway is for non-commercial traffic, with full or partial control of access.

2. Residential Collector Street - A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.

3. Local Residential Street - Cul-de-sacs, loop streets less than 750 meters in length, or streets less than one and a half kilometers in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

4. Cul-de-sac - A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn-around provided.

5. Frontage Road - A road that is parallel to a partial or full access controlled facility and provides access to adjacent land.

6. Alley - A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

II. Property

A. Building Setback Line - A line parallel to the street in front of which no structure shall be erected.

B. Easement - A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

C. Lot - A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development or both. The word "lot" includes the words "plat" and "parcel".

III. Subdivision

A. Subdivider - Any person, firm, corporation or official agent thereof, who subdivides of develops any land deemed to be a subdivision.

B. Subdivision - All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets; provided, however, that the following shall not be included within this definition nor subject to these regulations: (1) the combination or re-combination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein; (2) the division of land into parcels greater than four hectares where no street right-of-way dedication is involved, (3) the public acquisition, by purchase, of strips of land for the widening or the opening of streets; (4) the division of a tract in single ownership whose entire area is no greater than 0.8 hectares into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

C. Dedication - A gift, by the owner, of his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.

D. Reservation - Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

Design Standards

I. Streets and Roads

The design of all roads within the Planning Area shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials' (AASHTO) manuals.

The provision of street rights-of-way shall conform and meet the recommendations of the Thoroughfare Plan, as adopted by the municipality.

The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally the proposed streets should be the extension of existing streets if

possible.

A. Right-of-way Widths - Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out in the Thoroughfare Plan.

Table G-1
Right— of-Way Widths

Rural	Minimum ROW (ft)
Principal Arterials	
Freeway	350
Other	200
Minor Arterial	100
Major Collector	100
Minor Collector	80
Local Road	60[1]
Urban	
Major Thoroughfare Other than Freeway and Expressway	90
Minor Thoroughfare	70
Local Street	60[1]
Cul-de-Sac	Variable[2]

[1] The desirable minimum right-of-way (ROW) is 60 feet. If curb and gutter is provided, 50 feet of ROW is adequate on local residential streets.

[2] The ROW dimension will depend on radius used for vehicular turn around. Distance from edge of pavement of turn around to ROW should not be less than distance from edge of pavement to ROW on street approaching turn around.

The subdivider will only be required to dedicate a maximum of 100 feet of right-of-way. In cases where over 100 feet of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 100 feet. On all cases in which right-of-way is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principle and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width right-of-way, not less than 60 feet in width, may be dedicated when adjoining undeveloped property that is owned or controlled by the subdivider; provided that the width of a partial dedication be such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is subdivided, the remainder of the full required right-of-way shall be dedicated.

B. Street Widths - Widths for street and road classifications other than local shall be as recommended by the Thoroughfare

Plan. Width of local roads and streets shall be as follows:

1. Local Residential
   Curb and Gutter section: 26 feet, face to face of curb
   Shoulder section: 6 meters to edge of pavement, 4 feet for shoulders

2. Residential Collector
   Curb and Gutter section: 34 feet, face to face of curb
   Shoulder section: 20 feet to edge of pavement, 6 feet for shoulders

C. Geometric Characteristics - The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under Right-of-Way shall apply.

1. Design Speed - The design speed for a roadway should be a minimum of 10 km/h greater than the posted speed limit. The design speeds for subdivision type streets shall be:

Table G-2
Design Speeds (mph)

Facility Type	Desirable	Minimum Level	Minimum Rolling
RURAL			
Minor Collector Roads (ADT>2000)	60	50	40
Local Roads including Residential Collectors and Local Residential (ADT>400)	50	50	40
URBAN			
Major Thoroughfares other than Freeway or Expressway	60	50	40
Minor Thoroughfares	40	30	30
Local Streets	30	**30	**20

*Based on ADT of 400-750. Where roads serve a limited area and small number of units, can reduce minimum design speed.

**Based on projected ADT of 50-250.
(Reference NCDOT Roadway Design Manual page 1-1B)

2. Maximum and Minimum Grades

a. The maximum grades in percent shall be:

Table G-3
Maximum Vertical Grade (Percent)

Facility Type	Design Speed (mph)	Maximum Grade Flat	Rolling	Mountainous
RURAL				
Minor	20	7	10	12
Collector	30	7	9	10
Roads*	40	7	8	10
	50	6	7	9
	60	5	6	8
	70	4	5	6
Local Roads including	20	-	11	16
Residential Collectors	30	7	10	14
And Local Residential	40	7	9	12
Streets*	50	6	8	10
	60	5	6	-
URBAN				
Major Thoroughfares	30	8	9	11
other than Freeway	40	7	8	10
Or Expressway	50	6	7	9
	60	5	6	8
Minor Thoroughfares*	20	9	12	14
	30	9	11	12
	40	9	10	12
	50	7	8	10
	60	6	7	9
	70	5	6	7
Local Streets*	20	-	11	16
	30	7	10	14
	40	7	9	12
	50	6	8	10
	60	5	6	-

* For streets and roads with projected annual average daily traffic less than 250 or short grades less than 500 feet long, grades may be 2% steeper than the values in the above table.
(Reference NCDOT Roadway Design Manual page 1-12 T-3)

b. Minimum grade should not be less than 0.5%

c. Grades for 30 meters each way from intersections (measured from edge of pavement) should not exceed 5%.

3. Minimum Sight Distance - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the following parameters:

Table G-4 Sight Distance				
Design Speed, MPH	30	40	50	60
Stopping Sight Distance (ft):				
Minimum	200	275	400	525
Desirable	200	325	475	650
Minimum K* Value for:				
Crest Curve	30	60	110	190
Sag Curve	40	60	90	120
Passing Sight Distance (ft):				
Minimum Distance for 2 lanes	1100	1500	1800	2100

(General practice calls for vertical curves to be multiples of 50 feet. Calculated lengths shall be rounded up in each case.)
(Reference NCDOT Roadway Design Manual page 1-12 T-1)

4. The "Superelevation Table" shown below shows the minimum radius and the related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter is 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

Table G-5 Superelevation Table			
Design Speed mph	Maximum e*	Minimum Radius ft	Max.Deg. of Curve
30	0.04	302	19 00′
40	0.04	573	10 00′
50	0.04	955	6 00′
60	0.04	1637	3 45′
30	0.06	273	21 00′
40	0.06	521	11 15′
50	0.06	955	6 45′
60	0.06	1432	4 15′
30	0.08	260	22 45′
40	0.08	477	12 15′
50	0.08	819	7 30′
60	0.08	1146	4 45′

*e = rate of roadway superelevation, foot per foot (Reference NCDOT Roadway Design Manual page 1-12 T-6 thru T-8)
**K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length in meters of the vertical curve which will provide the desired sight distance. Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1990".

D. Intersections

1. Streets shall be laid out so as to intersect as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees.

2. Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.

3. Off-set intersections are to be avoided. A minimum length of 200 feet should separate intersections which cannot be aligned between survey centerlines.

E. Cul-de-sacs

Cul-de-sacs shall not be more 500 feet in length. The distance from the edge of pavement on the vehicular turn around to the right-of-way line should not be less than the distance from the edge of pavement to right-of-way line on the street approaching the turn around. Cul-de-sacs should not be used to avoid connection with an existing street or to avoid the extension of an important street.

F. Alleys

1. Alleys shall be required to serve lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provisions are made for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances.

2. The width of an alley shall be at least 20 feet.

3. Deadend alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turn around facilities at the deadend as may be required by the Planning Board.

G. Permits For Connection To State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any

construction on the street or road. The application is available at the office of the District Engineer of the Division of Highways.

H. Offsets To Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 30 feet from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 6 feet from the face of curb.

I. Wheel Chair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

J. Horizontal Width on Bridge Deck

1. The clear roadway widths for new and reconstructed bridges serving 2 lane, two-way traffic should be as follows:

a. Shoulder section approach

i. Under 800 ADT design year

Minimum 28 feet width face-to-face of parapets, rails, or pavement width plus 10 feet, whichever is greater.

ii. 800 - 2000 ADT design year

Minimum 34 feet width face to face of parapets, rails, or pavement width plus 3.6 meters, whichever is greater.

iii. Over 2000 ADT design year

Minimum width of 40 feet, desirable width of 44 feet width face-to-face of parapets or rails.

b. Curb and gutter approach

i. Under 800 ADT design year

Minimum 24 feet face to face of curbs.

ii. Over 800 ADT design year

Width of approach pavement measured face to face of

curbs.

Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face of curbs, and in crown drop. The distance from face of curb to face of parapet or rail shall be a minimum of 1.5', or greater if sidewalks are required.

2. The clear roadway widths for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic should be as follows:

   a. Shoulder section approach - Width of approach pavement plus width of usable shoulders on the approach left and right. (Shoulder width 8 feet minimum, 10 feet desirable.)

   b. Curb and gutter approach - Width of approach pavement measured face to face of curbs.

K. Vertical Clearance On Bridges

1. There should be 16 feet of vertical clearance between the top of the road and the bottom of a bridge.

2. There should be 23 feet of clearance between the top of the railroad track and the bottom of a bridge.

APPENDIX H

RECOMMENDED STREET DESIGN AND TABULATION INDEX

Although minimum requirements are necessary for all roads serving the public, the ultimate design of a road will vary according to the desired capacity and level-of-service to be provided. Universal standards in the design of thoroughfares, however, are not practical. Each road or highway section must be individually analyzed and its design requirements determined by the amount and type of projected traffic, existing capacity, desired level of service, and available right-of-way.

Typical Thoroughfare Cross Sections

Cross section requirements for thoroughfares vary according to the desired capacity and level of service to be provided. Universal standards in the design of thoroughfares are not practical. Each street section must be individually analyzed and its cross section requirements determined on the basis of amount and type of projected traffic, existing capacity, desired level of service, and available right-of-way.

Typical cross section recommendations are shown in Figure H-1. These cross sections are typical for facilities on new location and where right-of-way constraints are not critical. For widening projects and urban projects with limited right-of-way, special cross sections should be developed that meet the needs of the project. On all existing and proposed major thoroughfares delineated on the thoroughfare plan, adequate right-of-way should be protected or acquired for the ultimate cross sections.

Ultimate desirable cross sections for each thoroughfares are listed in this Appendix. Recommendations for "ultimate" cross sections are provided for: (1) thoroughfares which may require widening after the current planning period; (2) for thoroughfares which are borderline adequate and accelerated traffic growth could render them deficient; and (3) for thoroughfares where an urban curb and gutter cross section may be locally desirable because of urban development or redevelopment.

Recommended design standards relating to maximum and minimum grades, minimum sight distances, maximum degree of curve and related super elevation, and other considerations for thoroughfares are given in Appendix C. This Appendix gives definitions and design standards recommended for inclusion in subdivision regulations.

Cross sections "A" and "L" are typical for controlled access freeways. The 46 ft grassed median is the minimum desirable median width, but there could be some variation from this depending upon design considerations. Right-of-way requirements would typically vary upward from 228 ft depending upon cut and fill requirements.

Cross section "B," seven lane curb and gutter, should not be used for new projects. When the conditions warrant six lanes, cross section "D" should be recommended. Cross section "B" should be used only in special situations such as when widening from a five lane section and right-of-way is limited. Even in these situations, consideration should be given to converting the center turn lane to a median so that cross section "D" is the final cross section.

Cross section "C," five lane curb and gutter, is typical for major thoroughfares where frequent left turns are anticipated as a result of abutting development or frequent street intersections.

Cross sections "D," "E," and "M" are used on major thoroughfares where left turns and intersecting streets are not as frequent. Left turns would be restricted to a few selected intersections. The 16 ft median is the minimum recommended for an urban boulevard type cross section. In most instances, monolithic construction should be utilized due to greater cost effectiveness, ease and speed of placement, and reduced future maintenance requirements. In special cases, grassed or landscaped medians may be used in urban areas. However, these types of medians result in greatly increased maintenance costs and an increased danger to maintenance personnel. Non-monolithic medians should only be recommended when the above concerns are addressed.

Cross section "F" is recommended for urban boulevards or parkways to enhance the urban environment and to improve the compatibility of major thoroughfares with residential areas. A minimum median width of 24 ft is recommended with 30 ft being desirable.

Cross section "G" is recommended for major thoroughfares where projected travel indicates a need for four travel lanes but traffic is not excessively high, left turning movements are light, and right-of-way is restricted. An additional left turn lane would probably be required at major intersections. This cross section should be used only if the above criteria is met. If right-of-way is not restricted, future strip development could take place and the inner lanes could become de facto left turn lanes.

In urban environments, thoroughfares which are proposed

to function as one-way traffic carriers would typically require **cross section "H". Cross sections "I" and "J"** are usually recommended for urban minor thoroughfares since these facilities usually serve both land service and traffic service functions. **Cross section "I"** would be used on those minor thoroughfares where parking on both sides is needed as a result of more intense development.

Cross section "K" is used in rural areas or for staged construction of a wider multi-lane cross section. On some thoroughfares, projected traffic volumes may indicate that two travel lanes will adequately serve travel for a considerable period of time. For areas that are growing and future widening will be necessary, the full right-of-way of 100 ft should be required. In some instances, local ordinances may not allow the full 100 ft. In those cases, 70 ft should be preserved with the understanding that the full 100 ft will be preserved by use of building setbacks and future street line ordinances.

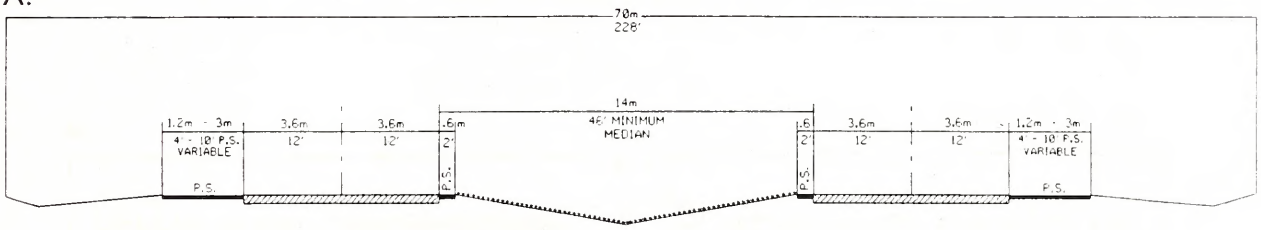
The urban curb and gutter cross sections all illustrate the sidewalk adjacent to the curb with a buffer or utility strip between the sidewalk and the minimum right-of-way line. This permits adequate setback for utility poles. If it is desired to move the sidewalk farther away from the street to provide additional separation for pedestrians or for aesthetic reasons, additional right-of-way must be provided to insure adequate setback for utility poles.

The right-of-ways shown for the typical cross sections are the minimum rights-of-way required to contain the street, sidewalks, utilities, and drainage facilities. Cut and fill requirements may require either additional right-of-way or construction easements. Obtaining construction easements is becoming the more common practice for urban thoroughfare construction.

If there is sufficient bicycle travel along the thoroughfare to justify a bicycle lane or bikeway, additional right-of-way may be required to contain the bicycle facilities. The North Carolina Bicycle Facilities Planning and Design Guidelines should be consulted for design standards for bicycle facilities. **Cross sections " N," " O," and " P"** are typically used to accommodate bicycle travel.

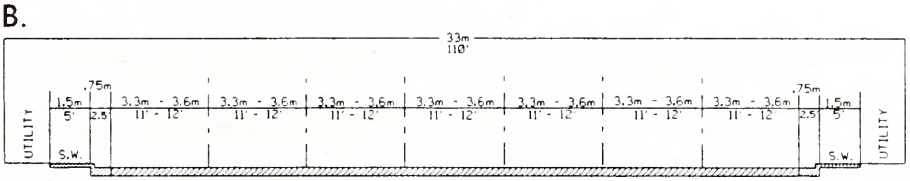
TYPICAL THOROUGHFARE CROSS SECTIONS

A.



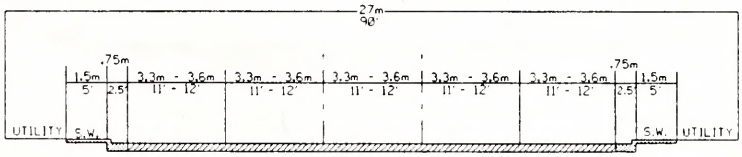
FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



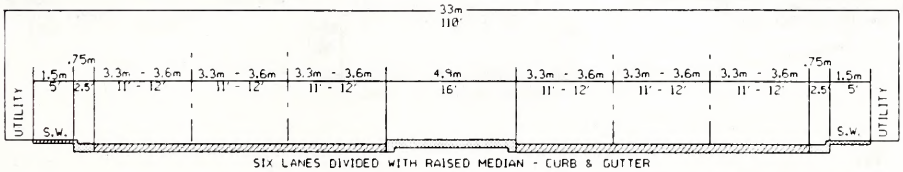
SEVEN LANES - CURB & GUTTER

C.



FIVE LANES - CURB & GUTTER

D.

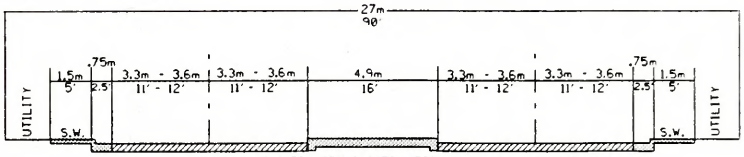


SIX LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

FIGURE H–1

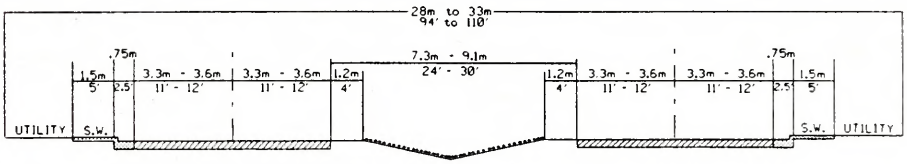
TYPICAL THOROUGHFARE CROSS SECTIONS

E.



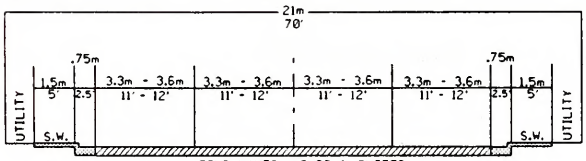
FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

F.



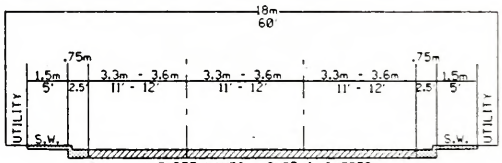
FOUR LANES DIVIDED - BOULEVARD
GRASS MEDIAN

G.



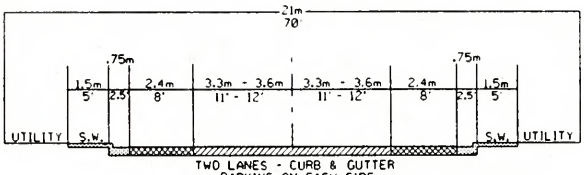
FOUR LANES - CURB & GUTTER

H.



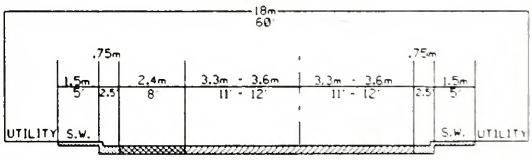
THREE LANES - CURB & GUTTER

I.



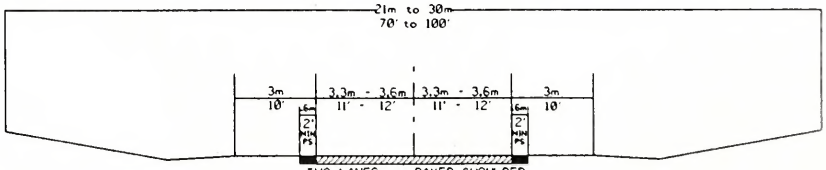
TWO LANES - CURB & GUTTER
PARKING ON EACH SIDE

J.



TWO LANES - CURB & GUTTER
PARKING ON ONE SIDE

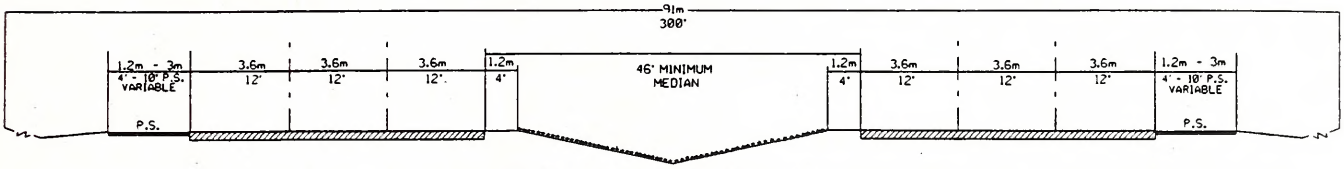
K.



TWO LANES - PAVED SHOULDER

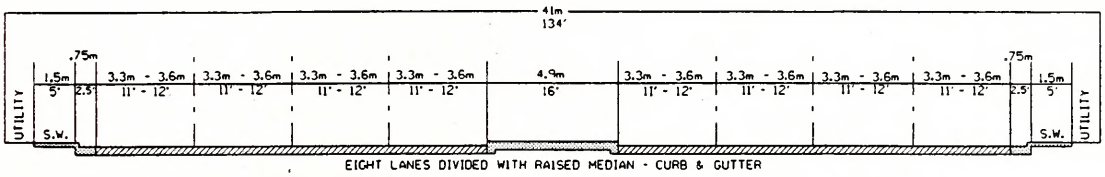
TYPICAL THOROUGHFARE CROSS SECTIONS

L.



SIX LANES DIVIDED WITH GRASS MEDIAN - FREEWAY

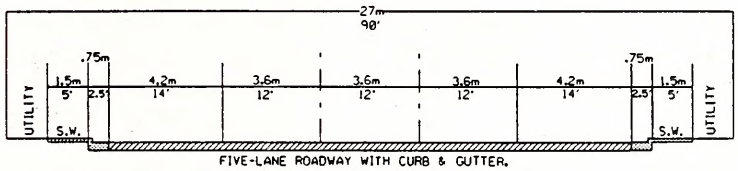
M.



EIGHT LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

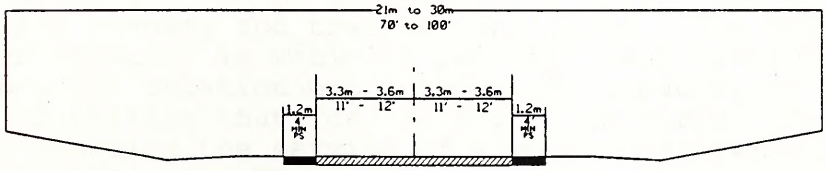
TYPICAL THOROUGHFARE CROSS SECTIONS FOR ACCOMMODATING BICYCLES

N.



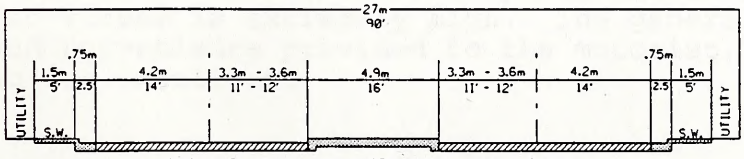
FIVE-LANE ROADWAY WITH CURB & GUTTER.
STANDARD INSIDE LANES & WIDENED CURB LANES

O.



TWO LANES - SHOULDER SECTION

P.



FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER.
STANDARD INSIDE LANES & WIDENED CURB LANES

FIGURE H–1

Level of Service Capacity

Capacity and Level of Service are terms used to describe how a road handles the traffic it carries. Many different factors contribute to the capacity of a roadway. These factors include:

1. Geometrics of the road, including:
   - Number of lanes
   - Horizontal and vertical alignment
   - Proximity of perceived obstructions to safe travel along the road
2. Typical users of the road, including:
   - Commuters
   - Recreational travelers
   - Truck traffic
3. Access control(including streets and driveways) along the road
4. Development along the road, such as:
   - Residential
   - Commercial
   - Industrial
5. Number of traffic signals along the route
6. Peak traffic characteristics on the road:
   - Rural roads tend to have a higher morning and afternoon peak period increase in traffic as compared to mid-day traffic
7. Characteristics of side roads feeding into the main road
8. Directional split of traffic, or the percentage of vehicles traveling in each direction along a road at any given time.

It is difficult to determine exactly when a road will reach its capacity because of these factors, and the changing nature of roads as development occurs. Capacity is defined as the maximum number of vehicles which has a reasonable expectation of passing over a given section of road during a given time period under prevailing roadway and traffic conditions. The most common unit used for capacity is vehicles per day. And Level of Service describes the relationship between the capacity of a road and the volume of traffic that road is forced to carry. Six levels are used to describe the service of a road under various speed and volume conditions. They are:

Level of Service A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian are excellent.

Level of Service B is in the range of stable flow, but the presence of the other users in the traffic stream begins to be noticable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream. The level of comfort and convenience provided is somewhat less than at LOS A because the presence of others begins to affect individual behavior.

Level of Service C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

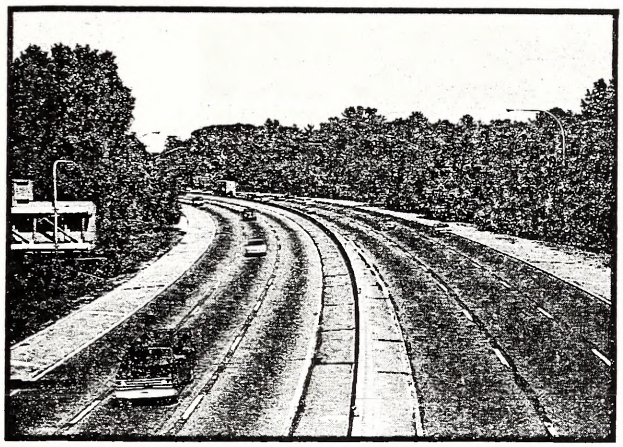
Level of Service D represents high-density, but stable flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small encreases in traffic flow will generally cause operational problems at this level.

Level of Service E represents operation conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accomodate such maneuvers. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable because small increases in flow or minor agitation within the traffic stream will cause breakdowns.

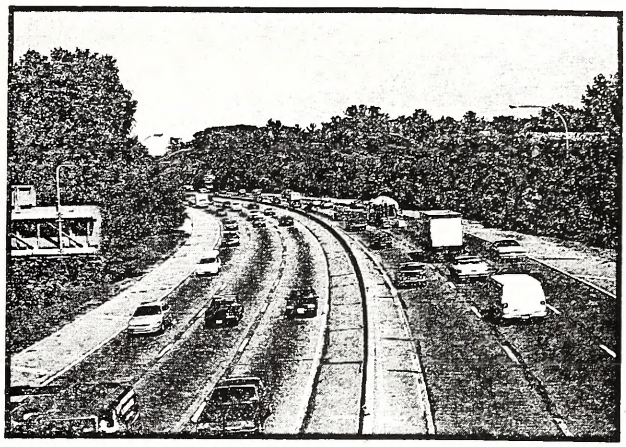
Level of Service F is used to define forced or brakedown flow. This condition exists wherever the amount of traffic approaching a point exceeds the theoretical amount which can traverse the point. Queues form behind such locations. It is the point at which arrival flow exceeds discharge flow which causes the queue to form. Operations within the queue are characterized by stop-and-go waves, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level of Service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of vehicles or pedestrians discharged from the queue may be quite good

Generally, Level of Service D is accepted by the planning profession as the "practical capacity" of a highway and a facility operating below that level of service is operating below tolerance. Table H-1 shows the "practical capacities" of a selection of urban facilities at Level of Service D.

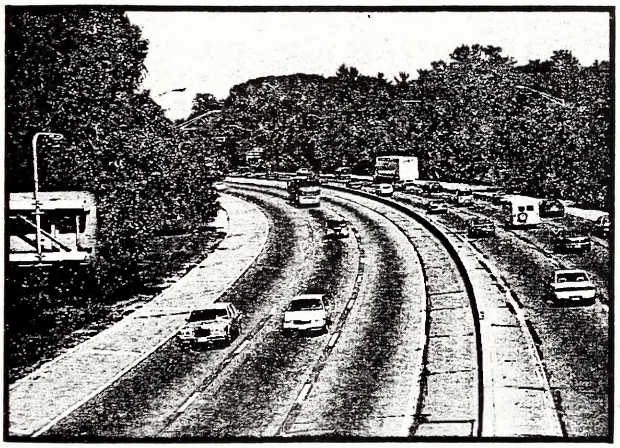
Source: 1994 Highway Capacity Manual



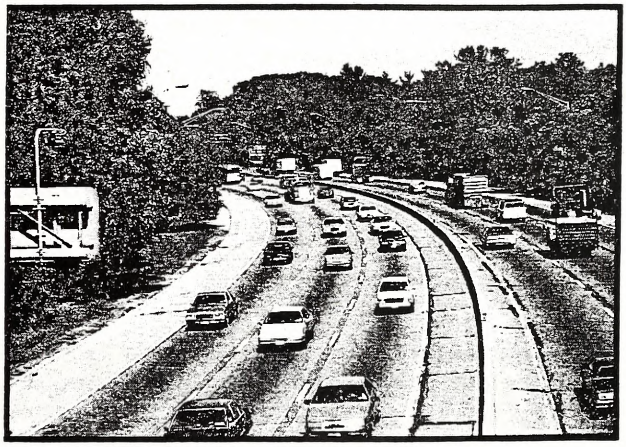
LOS A.



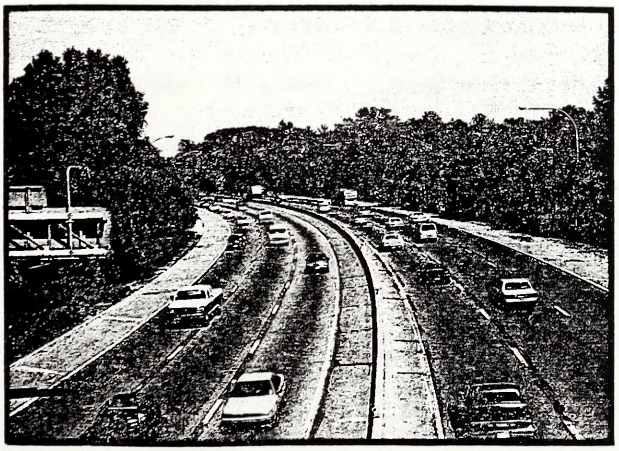
LOS D.



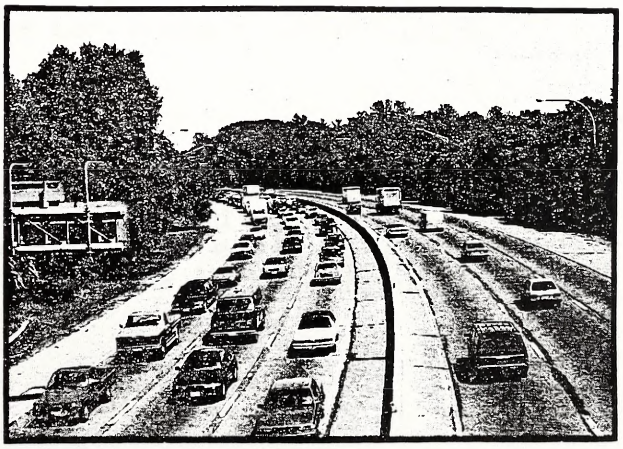
LOS B.



LOS E.



LOS C.



LOS F.

FIGURE H–2
LEVELS OF SERVICE

Table H-1 Practical Capacity for Urban Facilities		
Highway Type	**# Lanes**	**Vehicles/Day**
Urban Arterial	2	8000-12000
Urban Arterial	3*	12000-16000
Urban Arterial	4	18000-22000
Urban Arterial	5*	24000-28000
Urban Arterial	7*	36000-40000
Urban Freeway	4	40000-60000
Urban Freeway	6	60000-80000

* Continuous turn lane or at key locations

Minimum Lane Widths

For driver convenience, ease of operations, and safety, it would be desirable to widen all existing roads and highways to provide a minimum lane width of 12 feet. However, when considering overall statewide needs and available highway revenue, it has been found that this level of improvement applied statewide would be impractical. Therefore, it is necessary to establish minimum tolerable widths for existing roads with respect to traffic demand and economic feasibility. There are a number of roads in the Urban Area that have substandard widths. Because of the substantial cost of upgrading all secondary roads to standard, narrower widths may have to be tolerated until sufficient funds are available for improvement. The established traffic and corresponding widths used in determining recommended cross sections are given in Table H-2.

Table H-2 Minimum Tolerable Lane Widths*			
	Principal	**Minor**	
ADT	**Arterials**	**Arterials**	**Collectors**
Below 100	-	-	9
100-400	-	10	9
400-2000	-	10	10
Over 2000	11	11	11

* North Carolina Standards for highway construction

Street System Index

Table H-3 contains a detailed listing of all the roads on the Thoroughfare Plan. The table includes a description of each section, the length, its cross section, and right-of-way. Also included are existing and projected ADTs, existing roadway capacities, and the recommended ultimate lane configuration.

Table H-3
Street System Index

			Existing (1995)						Future (2025)			
Facility & Segment				Dist	Width	ROW	Capacity	AADT	Capacity	Volume	X-section	ROW
	from	to	lanes	(mi)	(ft)	(ft)	(vpd)	(vpd)	(vpd)	(vpd)		(ft)
Amity Hill Rd (SR 1001)												
	US 70	WCL Cleveland	2	0.25	24		9500	1000	ADQ	4100	K	70
	WCL Cleveland	Iredell Co	2	4.65	18		7000	650	(8000)	2400	K	70
Barger Rd (SR 2377)												
	Trexler Rd	Gold Knob Rd	2	0.80	16	60	6000		(12000)	1400	28	70
Bringle Ferry Rd (SR 1002)												
	SPB	Prov Ch Rd	2	1.20	24	80	11000	4600	(13000)	2900	O	ADQ
	Prov Ch Rd	St. Matthews Rd	2	4.20	18		7000	2500	ADQ	2200	ADQ	ADQ
	St. Matthews Rd	Richfield Rd	2	4.10	18		7000	850	ADQ	2800	ADQ	ADQ
	Richfield Rd	Davidson Co	2	0.80	18		7000	300	ADQ	500	ADQ	ADQ
Brown Rd (SR 1211)												
	CSRPB	Millbridge Rd	2	1.90	18	60	7000	700	(8500)	900	24	ADQ
Caldwell Rd (SR 1547)												
	NC 150	Millbridge Rd	2	2.00	16		7000		(11000)	10000	K	70
Concordia Ch/Corr Sp Rd (SR 1353,1554)												
	NC 152	Millbridge Rd	2	2.30	18	60	7000		ADQ	500	ADQ	ADQ
Cool Springs Rd (SR 1003,2048)												
	NC 801	Mt. Vernon Rd	2	4.50	22		9500	2300	ADQ	3200	ADQ	ADQ
	Mt. Vernon Rd	Baker Mill Rd	2	2.00	22	80	9500		ADQ	3200	ADQ	ADQ
	Baker Mill Rd	Chenault Rd	2	2.50	22		9500		ADQ	3300	ADQ	ADQ
	Chenault Rd	Iredell Co	2	1.40	22		9500		ADQ	1000	ADQ	ADQ
Doby Dr (SR 2351)												
	St Stephens Ch	US 52	2	0.10	18		7000		ADQ	400	ADQ	ADQ
Emanual Church Rd (SR 2338)												
	US 52	Rockwell CL	2	0.24	18		6500	1100	ADQ	500	ADQ	ADQ
	Rockwell Cl	O Beatty F Rd	2	2.61	18		7000	700	ADQ	500	ADQ	ADQ
	O Beatty F Rd	Cabarrus Co	2	0.86	16		6000		ADQ	300	ADQ	ADQ

Table H-3 Cont.
Street System Index

			Existing (1995)						Future (2025)			
Facility & Segment				Dist	Width	ROW	Capacity	AADT	Capacity	Volume	X-section	ROW
	from	to	lanes	(mi)	(ft)	(ft)	(vpd)	(vpd)	(vpd)	(vpd)		(ft)
Faith Rd (SR 1006)												
	SPB	NC 152	2	1.70	24	60	10000	3500	ADQ	5300	ADQ	ADQ
Gold Knob Rd (SR 2375)												
	Upper Palmer Rd	Barger Rd	2	0.20	16		6000	1300	(12000)	2100	28	70
Graham Rd (SR 1547)												
	NC 801	NC 150	2	3.30	18		7000	1000	(11000)	9200	K	70
Hall Rd (SR 1747)												
	Amity Hill Rd	Ketchie Rd	2	1.50	18		7000	200	(11000)	8300	K	70
Ketchie Rd (SR 1547)												
	Hall Rd	NC 801	2	2.30	16		6000	290	(11000)	8500	K	70
Liberty Rd (SR 2140)												
	US 52 Bypass	Hill Rd	2	2.75	22		7000	1000	ADQ	2600	ADQ	70
	Hill Rd	Stokes Ferry Rd	2	1.53	22		7000	1400	ADQ	1200	ADQ	70
Main St. Cleveland (SR 1743)												
	US 70	3rd CrCh	2	..70	18		6500		ADQ	5900	ADQ	ADQ
Market St (SR 2341)												
	Upper Palmer Rd	US 52	2	0.58	18		6500	2000	(12000)	3500	28	70
Millbridge Rd (SR 1350)												
	NC 152	Caldwell Rd	2	2.82	20		7000	1500	(11000)	8300	24	100
	Caldwell Rd	NC 150	2	2.60	18		7000	1700	ADQ	3500	ADQ	ADQ
Miller Rd (SR 1509)												
	CSRPB	Weaver Rd	2	0.60	18		7000	2300	ADQ	5900	ADQ	ADQ
	Weaver Rd	SPB	2	0.66	18		7000	2700	ADQ	3500	ADQ	ADQ
Mt. Hope Church Rd (SR 1505)												
	O Concord Rd	SPB	2	1.00	18		7000	2100	ADQ	4200	ADQ	ADQ

Table H-3 Cont.
Street System Index

			Existing (1995)						Future (2025)			
Facility & Segment				Dist	Width	ROW	Capacity	AADT	Capacity	Volume	X-section	ROW
	from	to	lanes	(mi)	(ft)	(ft)	(vpd)	(vpd)	(vpd)	(vpd)		(ft)
NC 8-49												
	Stanly Co	Davidson Co	4	0.31	50	230	23000	6100	(23000)	9100	ADQ	ADQ
NC 150												
	Iredell Co	Graham Rd	2	5.00	22	60	10000	2400	ADQ	7000	ADQ	ADQ
	Graham Rd	Millbridge Rd	2	2.30	18	60	7000	1900	(28000)	7200	N	90
	Millbridge Rd	SPB	2	1.44	18		7000	2400	(28000)	9900	N	90
NC 152												
	Iredell Co	CSRPB	2	4.29	24	60	11000	5700	(13000)	11500	H	60
	CSRPB	Old Concord Rd	2	1.30	20	60	8000	7000	(13000)	12000	H	60
	Old Concord Rd	Faith Rd	2	4.03	26		19000	5700	(12000)	11000	G	70
	Faith Rd	US 52	2	2.54	24		9500	5200	(12000)	6600	G	70
NC 801												
	Iredell Co	Centenary Rd	2	2.50	24	60	8500	2700	ADQ	4000	ADQ	ADQ
	Centenary Rd	Bear Poplar Rd	2	3.40	22	60	8500	2700	ADQ	7300	ADQ	ADQ
	Bear Poplar Rd	Sherrills Ford	2	8.40	24	60	8500	2700	ADQ	2400	ADQ	ADQ
	Sherrills Ford	US 70	2	1.70	24	100	8000	4100	ADQ	1800	ADQ	ADQ
	Common with US 70		2	1.42	24	150	10000	9700	ADQ	---	ADQ	ADQ
	US 70	Cool Springs Rd	2	0.32	24	100	10000		ADQ	5900	ADQ	ADQ
	Cool Springs Rd	Woodleaf Rd	2	3.68	20	100	8500	3200	ADQ	9400	ADQ	ADQ
	Woodleaf Rd	Davie Co	2	2.80	20	100	8500	3700	ADQ	6100	ADQ	ADQ
Old Beattys Ford Rd (SR 1221,2356)												
	O Concord Rd	Organ Ch Rd	2	4.84	20		8500	1600	ADQ	4600	22	ADQ
	Organ Ch Rd	L Stone Ch Rd	2	1.86	20		8500	2100	ADQ	2000	22	ADQ
	L Stone Ch Rd	Emmanual Ch Rd	2	1.93	20		8500	1200	ADQ	1200	ADQ	ADQ
	Emmanual Ch Rd	WCL Gold Hill	2	1.99	20		8500	1500	ADQ	1200	ADQ	ADQ
	WCL Gold Hill	ECL Gold Hill	2	0.86	20		7000	1300	ADQ	1400	ADQ	ADQ
	ECL Gold Hill	US 52 Bypass	2	1.30	20		8500		ADQ	1400	ADQ	ADQ
	US 52 Bypass	Stokes Ferry Rd	2	4.10	20		8500		ADQ	1600	ADQ	ADQ

Table H-3 Cont.
Street System Index

Facility & Segment			Existing (1995)						Future (2025)			
				Dist	Width	ROW	Capacity	AADT	Capacity	Volume	X-section	ROW
	from	to	lanes	(mi)	(ft)	(ft)	(vpd)	(vpd)	(vpd)	(vpd)		(ft)
Old Concord Rd (SR 1002)												
	O Beattys F Rd	NC 152	2	2.96	19	60	8000	2800	(13000)	8400	H	60
	NC 152	SPB	2	0.93	22		9500	4400	(13000)	9100	C	90
Old NC 80 (SR 2350)												
	St. Stephens C	Doby Dr	2	0.10	20		8000		ADQ	400	ADQ	ADQ
Old US 70 (SR 1957)												
	US 70	NC 801	2	0.58	18		6500	1400	ADQ	6200	ADQ	ADQ
	NC 801	ECL Cleveland	2	3.13	18		6500		ADQ	2700	ADQ	ADQ
	ECL Cleveland	Main St	2	0.43	24		9500		ADQ	5900	ADQ	ADQ
	Main St	Third Crk Ch Rd	2	0.18	24		9500		ADQ	1500	ADQ	ADQ
Organ Church Rd (SR 1006)												
	NC 152	O Beattys Ford	2	1.90	18	60	7000		ADQ	3000	ADQ	ADQ
	O Beattys Ford	Cabarrus Co	2	2.31	16	60	6000	1000	ADQ	1100	ADQ	ADQ
	Patterson Road											
Patterson Rd (SR 1533)												
	Millbridge Rd	Weaver Rd	2	2.25	16	60	6000		(8500)	2600	22	ADQ
	Weaver Rd	NC 150	2	2.50	16	60	6000	500	(8500)	2600	22	ADQ
Providence Church Rd (SR 2134)												
	Goodman Lke Rd	Bringle Ferry R	2	1.72	22		8500	850	ADQ	500	ADQ	ADQ
	Bringle Ferry R	Stokes Ferry Rd	2	1.68	16		6000		ADQ	300	ADQ	ADQ
Richfield Rd (SR 1005)												
	Bringle Ferry R	Reeves Island R	2	4.50	18		7000	440	ADQ	200	ADQ	ADQ
	Reeves Island R	Stokes Ferry Rd	2	0.90	18		7000	600	ADQ	200	ADQ	ADQ
	Stokes Ferry Rd	Stanly Co	2	1.00	18	60	7000		ADQ	800	ADQ	ADQ
St. Matthews Rd (SR 2140)												
	Stokes Ferry Rd	Bringle Ferry R	2	3.16	20		8500		ADQ	600	ADQ	ADQ

Table H-3 Cont.
Street System Index

			Existing (1995)						Future (2025)			
Facility & Segment				Dist	Width	ROW	Capacity	AADT	Capacity	Volume	X-section	ROW
	from	to	lanes	(mi)	(ft)	(ft)	(vpd)	(vpd)	(vpd)	(vpd)		(ft)
St. Stephens Church Rd (SR 2352)												
	Cabarrus Co	O Beattys F Rd	2	0.44	22		9500		ADQ	600	ADQ	ADQ
	O Beattys F Rd	Old NC 80	2	0.93	18		7000	120	ADQ	500	ADQ	ADQ
Stokes Ferry Rd (SR 1004)												
	SPB	Prov Ch	2	0.56	20	60	7000	4700	ADQ	3800	ADQ	ADQ
	Prov Ch	Trexler Rd	2	1.37	20	60	7000		ADQ	4000	ADQ	ADQ
	Trexler Rd	St. Matthews Rd	2	2.32	20	60	7000	4200	ADQ	4000	ADQ	ADQ
	St. Matthews Rd	O Beattys F Rd	2	7.01	22	60	7000	1100	ADQ	1300	ADQ	ADQ
	O Beattys F Rd	Richfield Rd	2	0.20	22	60	7000		ADQ	1200	ADQ	ADQ
	Richfield Rd	Stanly Co	2	2.70	22	60	7000	1500	ADQ	400	ADQ	ADQ
Stone Rd (SR 2315)												
	SPB	US 52	2	0.51	18		7000		ADQ	1400	ADQ	ADQ
Third Creek Church Rd (SR 1957, 1973)												
	US 70	Baker Mill Rd	2	3.00	16		6000	400	8500	1500	20	ADQ
	Baker Mill Rd	NCL Cleveland	2	2.03	20	60	8500	1300	ADQ	1500	ADQ	ADQ
	NCL Cleveland	Main St	2	0.13	18		7000		8500	1500	20	ADQ
Trexler Rd (SR 2378)												
	Barger Rd	Stokes Ferry Rd	2	1.10	16		6000	800	(12000)	1400	28	70
Unity Rd (SR 1355)												
	CSRPB	NC 152	2	2.00	16	60	6000		ADQ	2200	ADQ	ADQ
Upper Palmer Rd (SR 2341)												
	Gold Knob Rd	Lower Palmer Rd	2	0.58	16		6000	450	(12000)	2400	28	70
	Lower Palmer Rd	US 52 Bypass	2	0.15	18		7000		(12000)	2400	28	70
	US 52 Bypass	Market St	2	0.51	18		7000		(12000)	2700	28	70

Table H-3 Cont.
Street System Index

Facility & Segment			Existing (1995)						Future (2025)			
				Dist	Width	ROW	Capacity	AADT	Capacity	Volume	X-section	ROW
	from	to	lanes	(mi)	(ft)	(ft)	(vpd)	(vpd)	(vpd)	(vpd)		(ft)
US 52												
	SPB	NC 152	2	2.88	28	60	9000	11000	ADQ	6100	ADQ	ADQ
	NC 152	Emmanual Ch Rd	2	0.42	38	60	9000		ADQ	8300	ADQ	ADQ
	Emmanual Ch Rd	US 52 Bypass	2	4.17	28	60	9000	7300	ADQ	6800	ADQ	ADQ
	Common with US 52 Bypass			3.00								
	US 52 Bypass	Cabarrus Co	2	0.50	28	60	9000	6300	ADQ	1700	ADQ	ADQ
US 52 Bypass												
	SPB	Upper Palmer Rd	--	2.41	--	--	--	--	(43000)	3900	F	110
	Upper Palmer Rd	US 52	--	2.67	--	--	--	--	(43000)	7100	F	110
	US 52	Liberty Rd	--	1.32	28	60	9000	6800	(43000)	13000	F	110
	Liberty Rd	Doby Dr	--	0.16	28	60	9000		(43000)	15600	F	110
	Doby Dr	O Beattys F Rd	--	1.50	28	60	9000	6300	(43000)	15400	F	110
	O Beattys F Rd	US 52	--	0.10	28	60	9000		(43000)	10500	F	110
	US 52	Cabarrus Co	--	1.21	--	--	--	--	(43000)	9500	F	110
US 70												
	Iredell Co	WCL Cleveland	2	3.22	24	150	11000		(28000)	24700	F	110
	WCL Cleveland	ECL Cleveland	2	0.90	24	150	9500	9600	(28000)	15200	N	90
	ECL Cleveland	NC 801	2	4.34	24	150	9500	9300	(28000)	15200	F	110
	NC 801	NC 801	2	1.42	24	80	10000	9700	(28000)	15600	F	110
	NC 801	Old 70	2	0.65	24	80	11000		(28000)	14300	F	110
	Old 70	SPB	2	0.60	44	80	12000	10800	(28000)	20100	F	110
US 601												
	Davie Co	SPB	2	1.42	24	150	11000	4300	ADQ	8500	ADQ	ADQ
Weaver Rd (SR 1535)												
	Millbridge Rd	Patterson Rd	2	1.40	18		7000		ADQ	1900	ADQ	ADQ
	Patterson Rd	Miller Rd	2	2.20	18		7000		ADQ	1900	ADQ	ADQ
White Rd (SR 1737)												
	NC 150	Sherrills Ford	2	3.20	16		6000	1000	ADQ	1600	ADQ	ADQ
Woodleaf Rd (SR 2048)												
	SPB	NC 801	2	2.70	18		7000	3500	(12500)	9700	24	ADQ

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